VOLUME XXXIX

NUMBER THREE

THE NATIONAL GEOGRAPHIC MAGAZINE

MARCH, 1921

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From London to Australia by Aeroplane

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10 Illustrations

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Important contributions to geographic science are constantly being made through expeditions financed by funds set aside from the Society's income. For example, immediately after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. So important was the completion of this work considered that four expeditions have followed and the extraordinary scientific data resultant given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures, evidently formed by nature as a huge safety-valve for erupting Katmai. By proclamation of the President of the United States, this area has been created a National Monument. The Society organized and supported a large party, which made a three-year study of Alaskan glacial fields, the most remarkable in existence. At an expense of over $50,000 it has sent a notable series of expeditions into Peru to investigate the traces of the Inca race. The discoveries of these expeditions form a large share of the world's knowledge of a civilization which was waning when Pizarro first set foot in Peru. Trained geologists were sent to Mt. Pelee, La Soufriere, and Messina following the eruptions and earthquakes. The Society also had the honor of subscribing a substantial sum to the historic expedition of Admiral Peary, who discovered the North Pole April 6, 1909. Not long ago the Society granted $20,000 to the Federal Government when the congressional appropriation for the purchase was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people and incorporated into a National Park.

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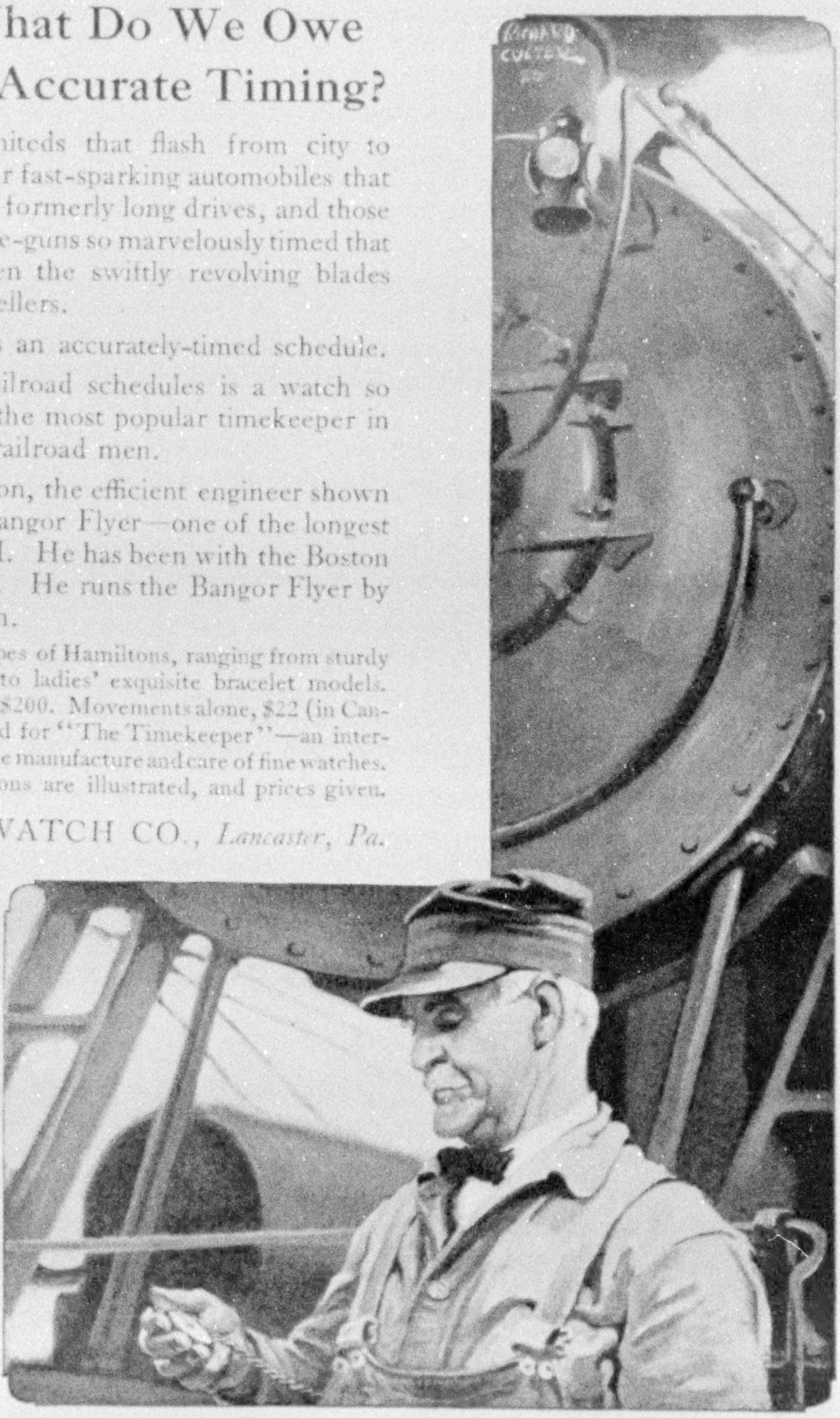

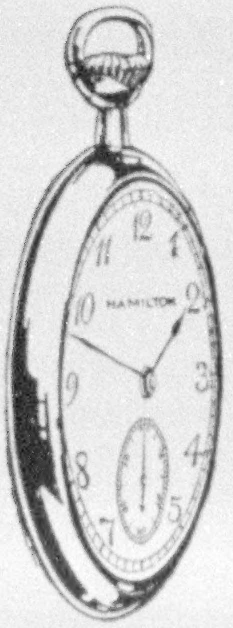

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* * *

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* * *

Where will you give your trade?

Will you give it to the man who sells every kind of tire; who lets *price* decide for you instead of *value?* Who shirks a real merchant's responsibility and *puts it up to you to pick a good one?*

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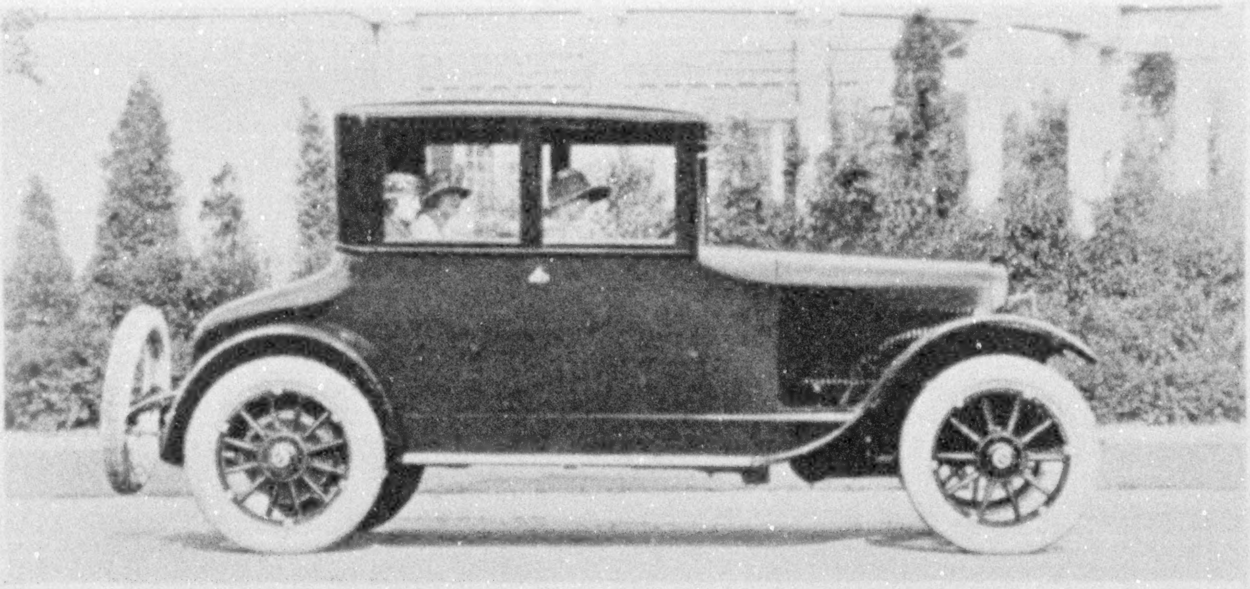

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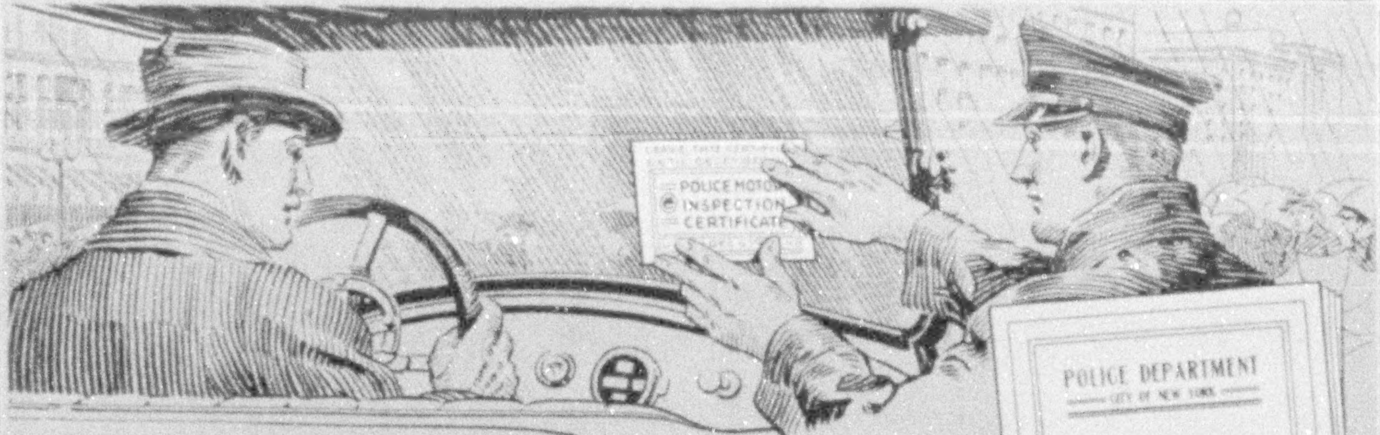
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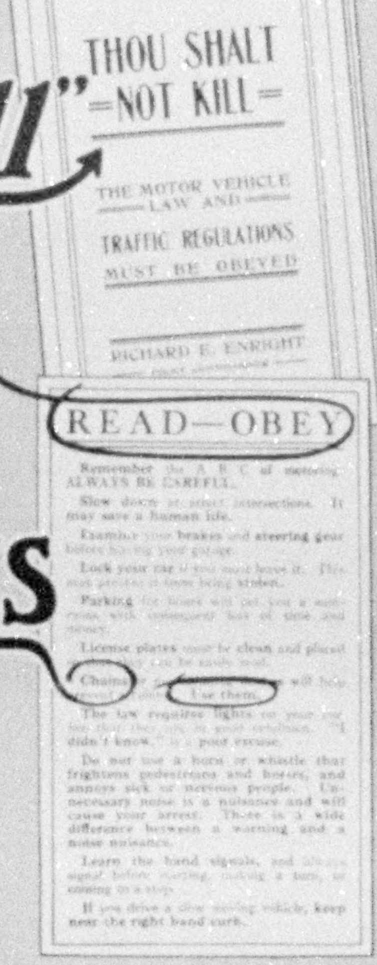
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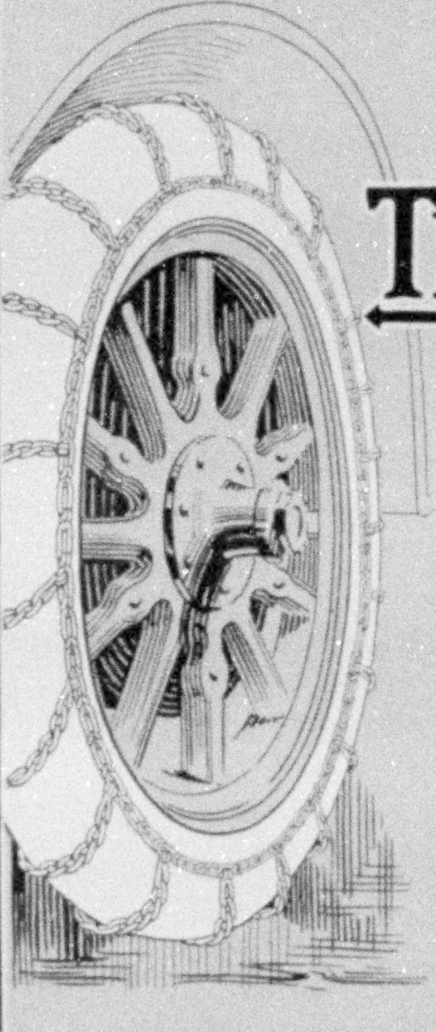

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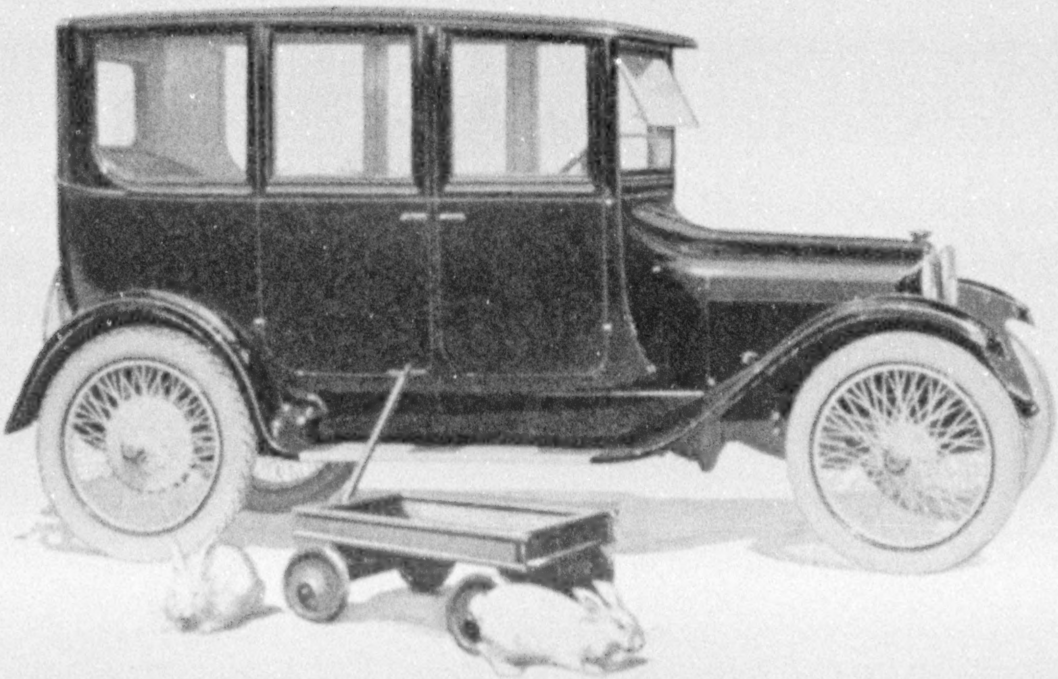

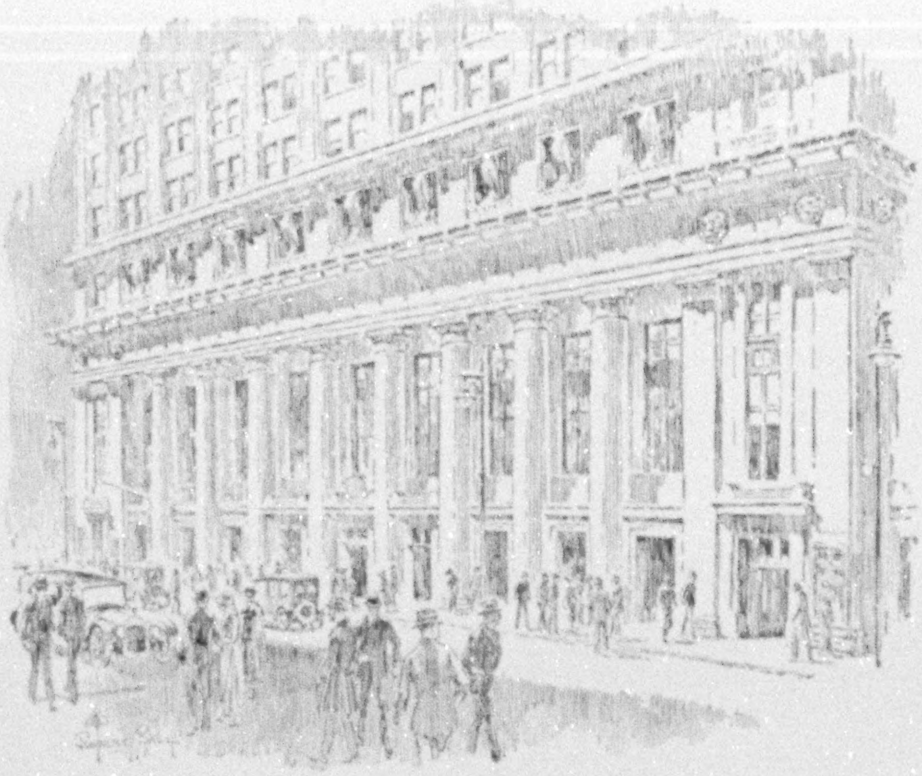

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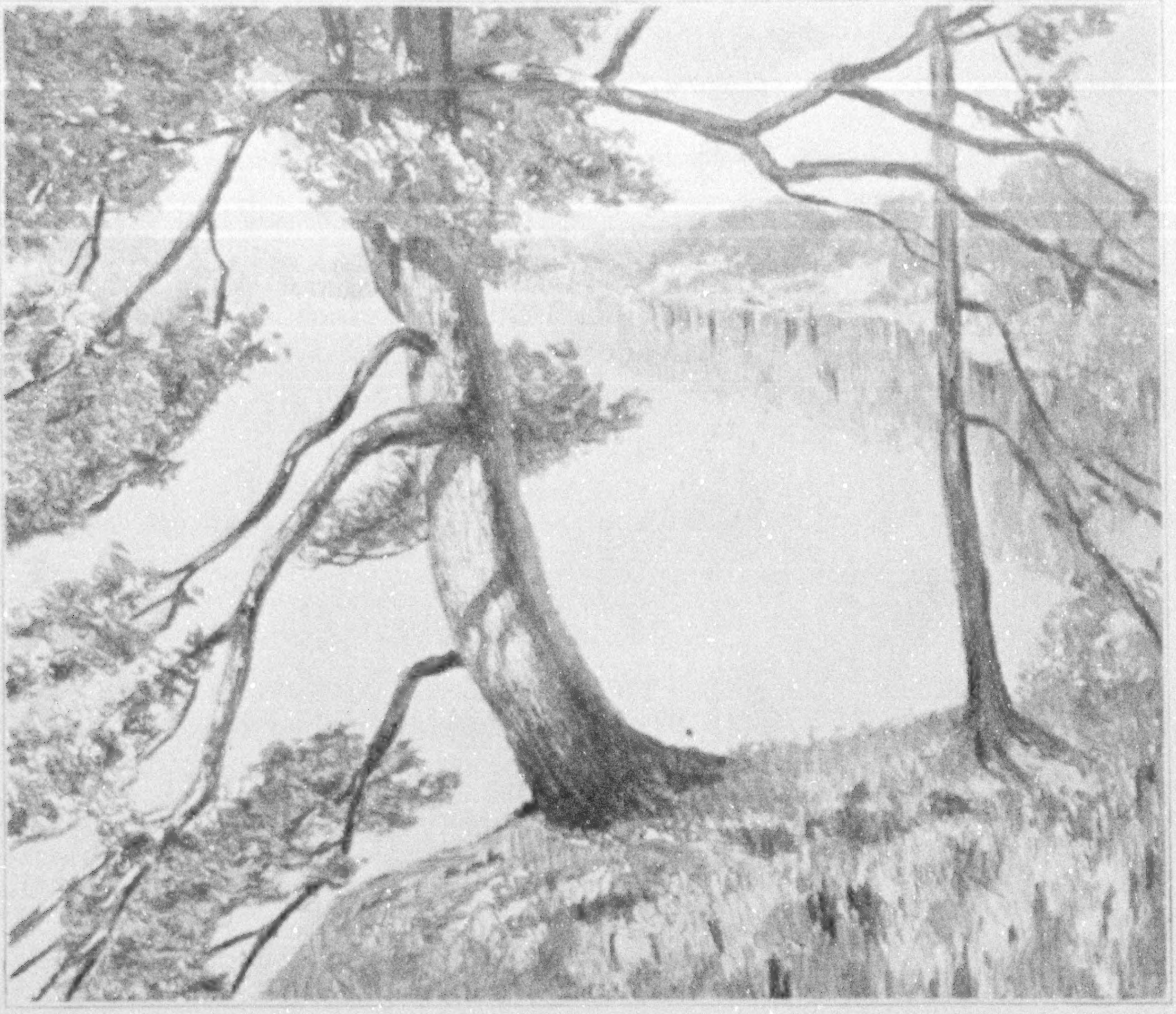

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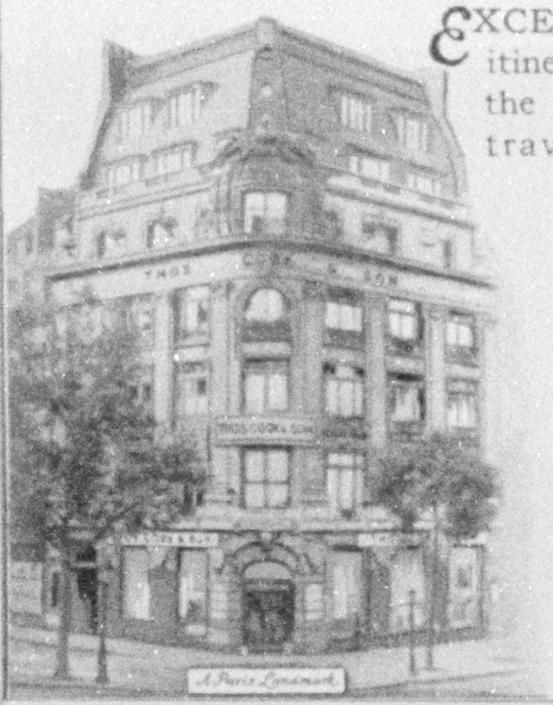

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VOL. XXXIX, NO. 3 WASHINGTON MARCH, 1921

THE NATIONAL GEOGRAPHIC MAGAZINE

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FROM LONDON TO AUSTRALIA BY AËROPLANE

A Personal Narrative of the First Aërial Voyage Half Around the World

By Sir Ross Smith, K. B. E.*

During the latter phase of the war, while I was flying with the Number One Australian Flying Squadron in Palestine, a Handley-Page aëroplane was flown out from England by Brigadier-General A. E. Borton, C. M. G., D. S. O., A. F. C., to take part in Allenby's last offensive. It was intended that this monster aëroplane should be chiefly employed in carrying out active night bombing operations against the enemy. I hailed as good fortune the orders that detailed me to fly it. The remarkable success eventually achieved by this terrible engine of destruction, and its unfailing reliability during the ensuing long-distance flights, inspired in me great confidence and opened my eyes to the possibilities of modern aëroplanes and their application to commercial uses.

A CHALLENGE IN JEST

It is in a large measure due to the extensive experiences gained while piloting this Handley-Page machine that I was induced to embark upon and carry to a successful issue the first aërial voyage from London to Australia. In a lesser degree, the undertaking was suggested in a joke. One day General Borton visited our squadron and informed me that he was planning a flight in order to link up the forces in Palestine with the army in Mesopotamia. He invited me to join him.

There was a further proposal, that after reaching Bagdad we should shape a route to India, "to see," as he jocularly remarked, "the Viceroy's Cup run in Calcutta."

"Then, after that," I replied, "let us fly on to Australia and see the Melbourne Cup," little thinking at the time that I should ever embark upon such a project.

Just after the Armistice was signed, General Borton decided to start out in the Handley-Page for India. Major-General Sir W. G. H. Salmond, K. C. M. G., C. B., D. S. O., commanding the Royal Air Force in the Middle East, would accompany us and carry out a tour of inspection.

On November 29, 1918, we took our departure from Cairo, accompanied by my two air mechanics, Sergeant J. M. Bennett, A. F. M., M. S. M., and Sergeant W. H. Shiers, A. F. M., both of No. 1 Squadron. It took just three weeks to pioneer a route to India, where we arrived, without mishap, on December 10, 1918, scarcely a month after the signing of the Armistice.

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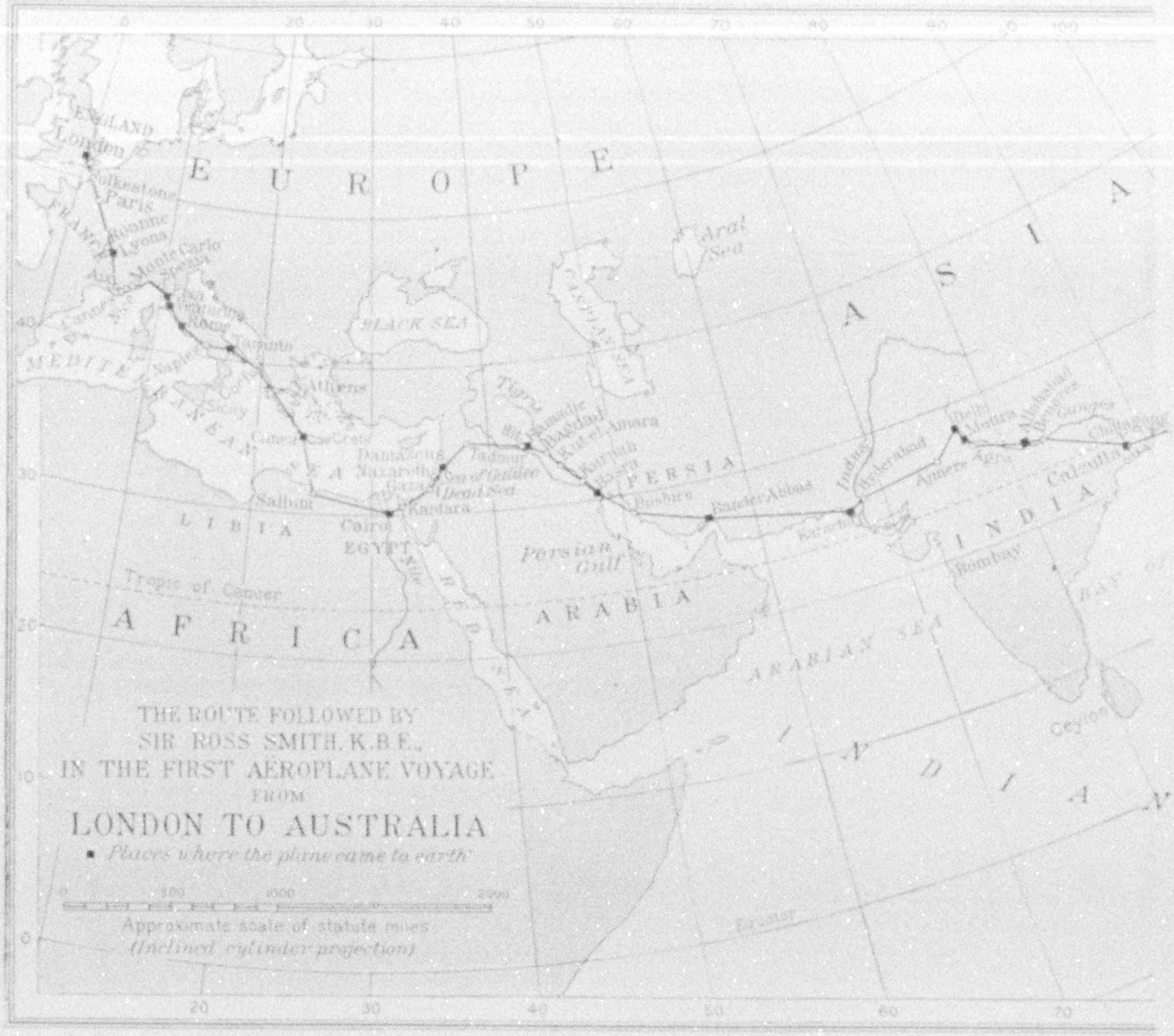

THE ROUTE FOLLOWED BY
SIR ROSS SMITH, K.B.E.,
IN THE FIRST AEROPLANE VOYAGE
FROM
LONDON TO AUSTRALIA
■ Places where the plane came to earth
Approximate scale of statute miles
(Inclined cylinder projection)
EUROPE
ASIA
AFRICA
ARABIA
PERSIA
INDIA
LIBIA
EGYPT
ENGLAND
FRANCE
London
Folkestone
Paris
Lyons
Monte Carlo
Rome
Taranto
Naples
Athens
Crete
Candia
Sollum
Cairo
Kantara
Damascus
Nazareth
Sea of Galilee
Dead Sea
Tadmor
Baghdad
Kut-el-Amara
Basra
Bushire
Bander Abbas
Karachi
Delhi
Muttra
Agra
Ajmere
Allahabad
Benares
Calcutta
Chittagong
Bombay
Ceylon
BLACK SEA
CASPIAN SEA
Aral Sea
Persian Gulf
RED SEA
ARABIAN SEA
INDIAN
BAY OF
Tropic of Cancer
Equator
Tigris
Indus
Ganges
Nile

Major-General Salmond was very proud of this achievement, for it demonstrated that the new arm of the service, the Royal Air Force, had begun to concentrate its efforts on peaceful developments and the establishment of long-distance commercial air routes.

This was the longest flight that had ever been made up to this time, and it convinced me that a machine, properly attended and equipped, was capable of flying anywhere, provided suitable landing grounds existed.

EXPLORING THE ROUTE

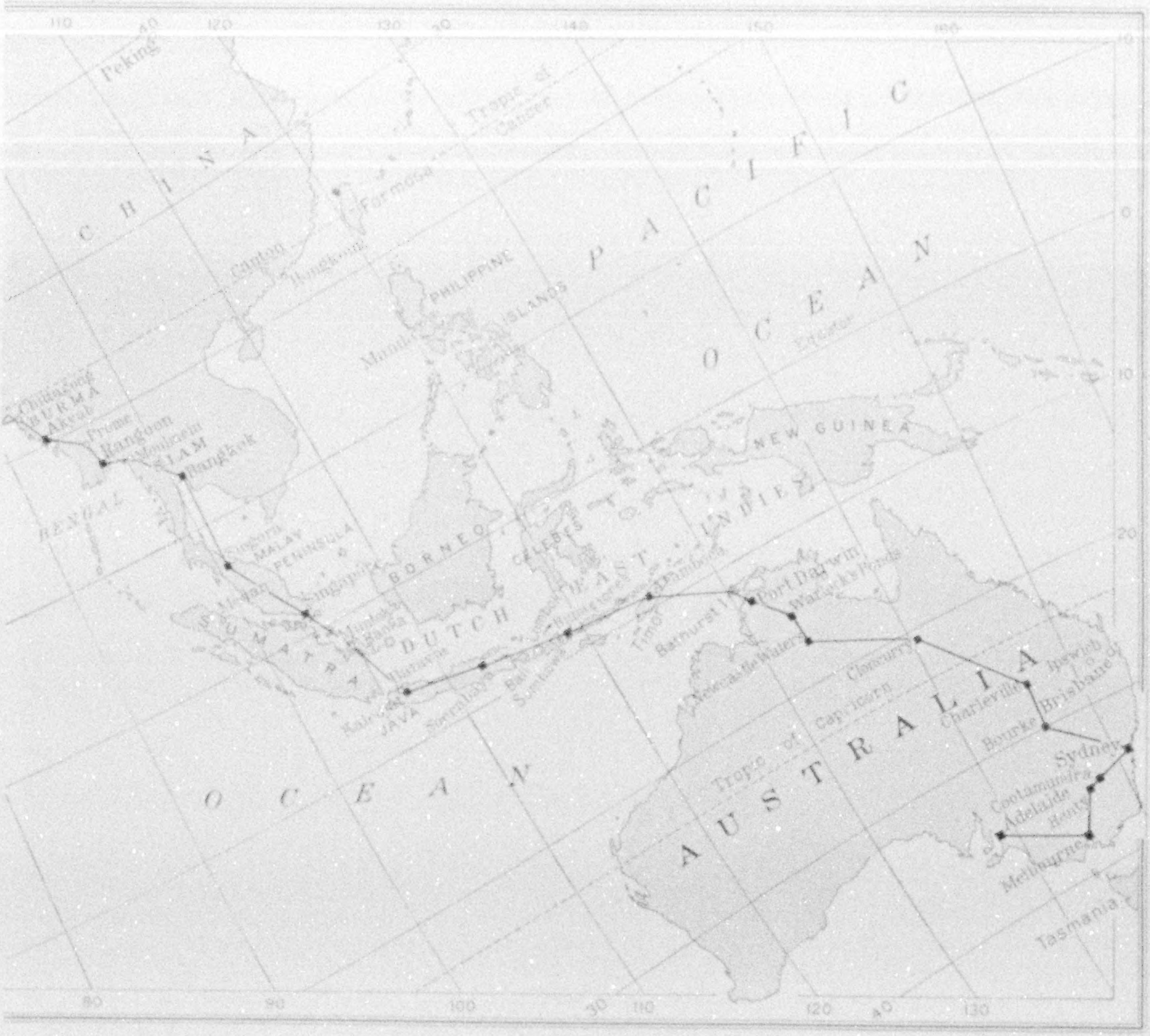
After our arrival in India, General Borton communicated with the Air Ministry and asked for permission to charter a steamer to enable him to proceed to Australia to explore the route and arrange suitable landing grounds.

I was to accompany General Borton on this expedition as his staff captain, and it was our intention, after surveying out the route, to return to India, join up with our machine, and continue the flight to Australia over the established course.

The Air Ministry acceded to General Borton's wishes, and the Indian Government accordingly placed at our disposal the R. I. M. S. *Sphinx*. On February 10, 1919, we sailed from Calcutta, our hold stowed tight with stores and equipment and 7,000 gallons of petrol. We intended to dump 200 gallons of petrol at each landing place for the anticipated flight. But all our well-laid schemes ended in smoke.

THE "SPHINX" BLOWS UP

Two days later, just after leaving Chittagong, in East Bengal, our first port of call, the *Sphinx* caught fire and blew up.


Peking
CHINA
Tropic of Cancer
Formosa
Canton
Hongkong
PHILIPPINE ISLANDS
Manila
PACIFIC
OCEAN
Equator
Chittagong
BURMA
Akyab
Prome
Rangoon
Moulmein
SIAM
Bangkok
BENGAL
MALAY PENINSULA
Singapore
BORNEO
CELEBES
SUMATRA
DUTCH
EAST INDIES
NEW GUINEA
Amboina
Batavia
Kalidjati
JAVA
Sourabaya
Bima
Timor
Bathurst I.
Port Darwin
Warlock's Ponds
Newcastle Waters
Cloncurry
Longreach
Charleville
Ipswich
Brisbane
Bourke
Sydney
Cootamundra
Adelaide
Henty
Melbourne
Tasmania
Tropic of Capricorn
AUSTRALIA
OCEAN

Drawn by A. H. Bumstead

We narrowly escaped going up with it. We lost everything but our lives.

After this mishap we were compelled to return to India to refit. The Indian Government generously lent us another vessel, the R. I. M. S. *Minto*. This time we carried no petrol.

The expedition was rewarded with splendid success during the period of three months we were engaged upon it. We visited Burma, the Federated Malay States, the Netherlands Indies, Borneo, and Siam.

Upon our return to India we were chagrined to find that our machine had been taken up to the northwest frontier to participate in a bombing offensive against the Afghans, and had been crashed in a storm.

However, our heart-pangs were mitigated when we learned that the Australian Commonwealth Government had offered a prize of £10,000 for the first machine (manned by Australians) to fly from London to Australia in 30 days.

Hearing this, I knew there would be many competitors, and the spirit of rivalry grew tense. It stimulated in me a keenness—more than ever—to attempt the flight. My difficulty was how to reach England in time.

SECURING A MACHINE FOR AUSTRALIA

Shortly afterward General Borton was instructed to return to London to report on the route. This opened the avenue of transport for myself and my two mechanics. General Borton himself was very keen to join in the flight to Australia, but, unfortunately, not being an Australian, he was debarred from entering the competition. He very kindly approached Messrs. Vickers Ltd. and asked them if they would supply a machine for

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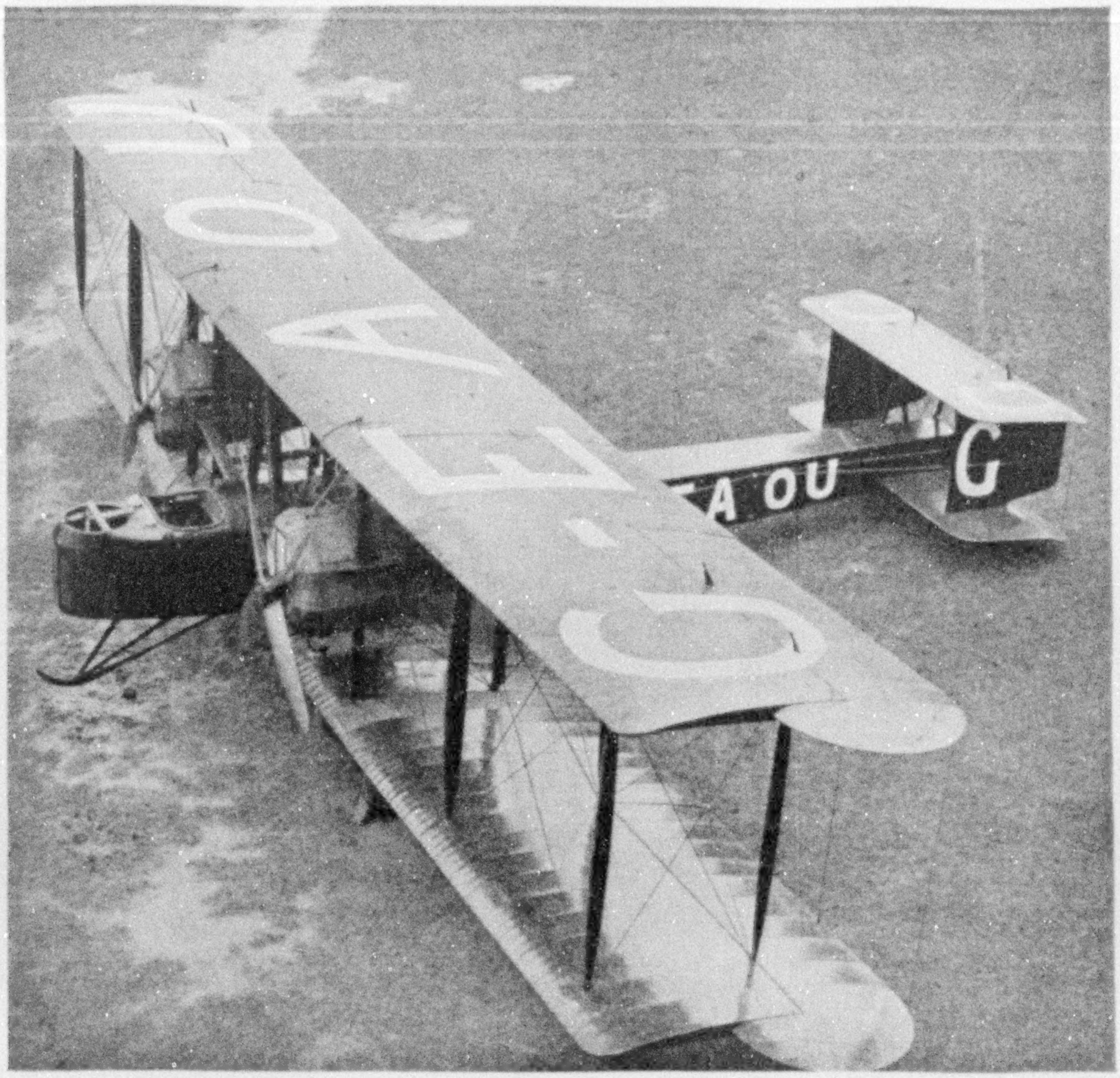

Photograph by Sir Ross Smith

THE PLANE WHICH MADE THE LONDON-TO-AUSTRALIA FLIGHT

This standard Vickers-Vimy bombing plane, equipped with two Rolls-Royce "Eagle VIII" engines of 360 horsepower each, is the same type of machine with which Sir John Alcock made the non-stop transatlantic flight.

the flight. This, at first, they refused to do, but after General Borton pointed out that I had already done a considerable amount of long-distance flying and had been over nearly the whole route, as well as assisted in pioneering it, they finally consented.

My brother Keith was at the time in England awaiting repatriation to Australia. During the latter part of the war he had been flying with the Royal Air Force and had gained extensive and varied air experience. I therefore decided that he would be the best man to take as assistant air pilot and navigator.

Sergeants Bennett and Shiers, in view of their excellent services and the knowledge of machines that they gained in the flight from Cairo to Calcutta, were to accompany us as air mechanics, thus making a total crew of four.

Vickers did not definitely decide to enter the machine for the competition until October, and as we left London on November 12, it will be seen that the time to prepare for such an undertaking was very limited. Our preparations were doubly hurried, first by the knowledge that four other machines had entered the competition and were actually ready to start before the Vickers Company had handed over their machine to us, and,

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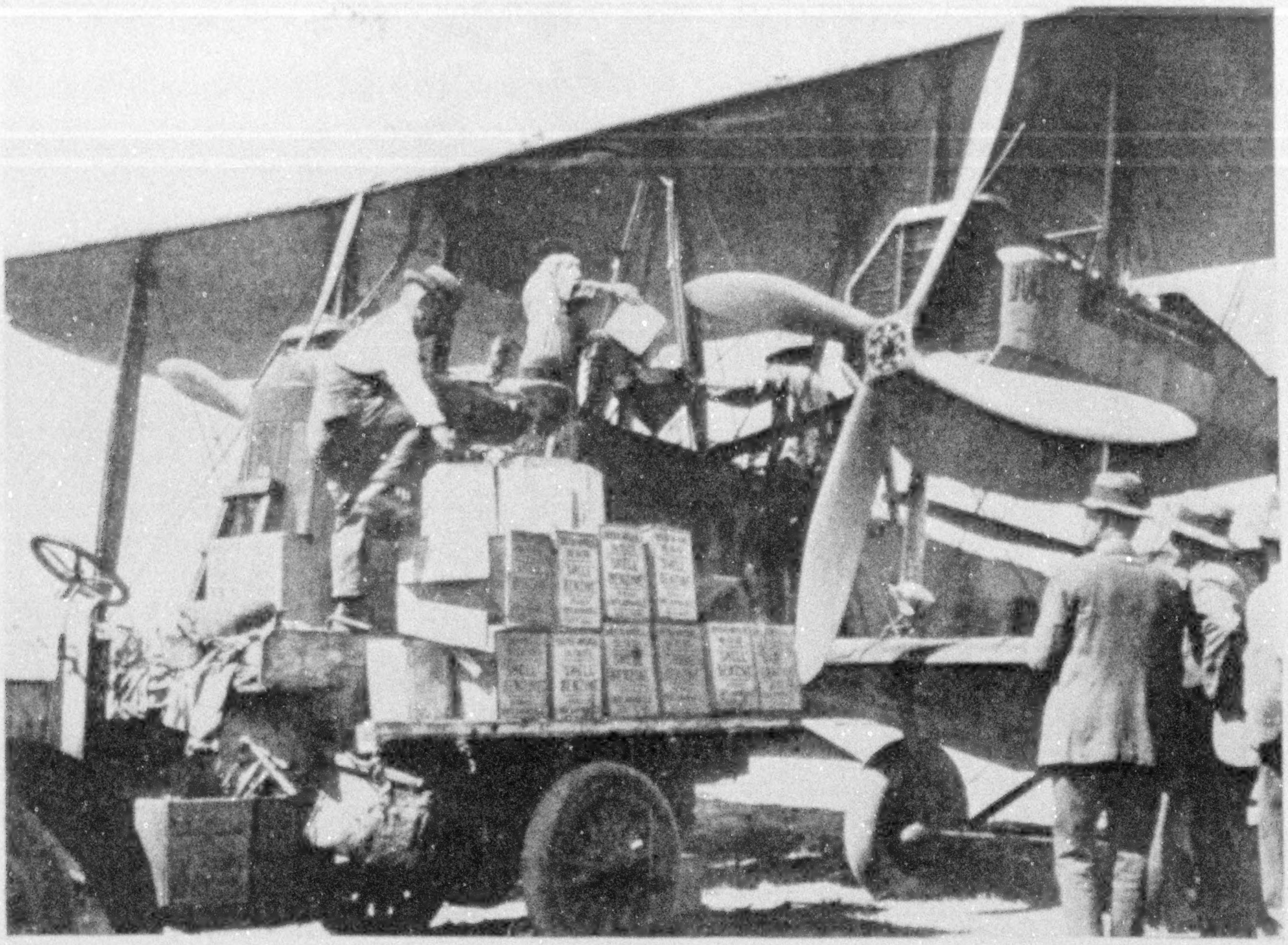


Photograph by Sir Ross Smith

FILLING THE PETROL TANKS OF THE VIMY WITH "SHELL"

When fully loaded, the great flying-machine, with its wing spread of 67 feet, weighed 13,000 pounds. Its petrol tanks had a capacity sufficient to keep the plane in the air for 13 hours, traveling at a speed of 80 miles an hour (see text, page 237).

second, by the fact that winter was fast approaching and the season might break at any time, thus rendering long-distance flying extremely hazardous.

Once Vickers had decided to enter the machine, however, they threw themselves whole-heartedly into the project and practically gave me a free hand to make whatever arrangements I deemed essential. I had gone minutely into all the intricate details of equipment, the question of supplies, fuel, etc., during my return voyage to England.

The "Shell" Marketing Co. agreed to have our petrol supplies at the required depots to tabulated dates, and Messrs. Wakefield Ltd. in a similar capacity undertook to arrange for lubricating oils.

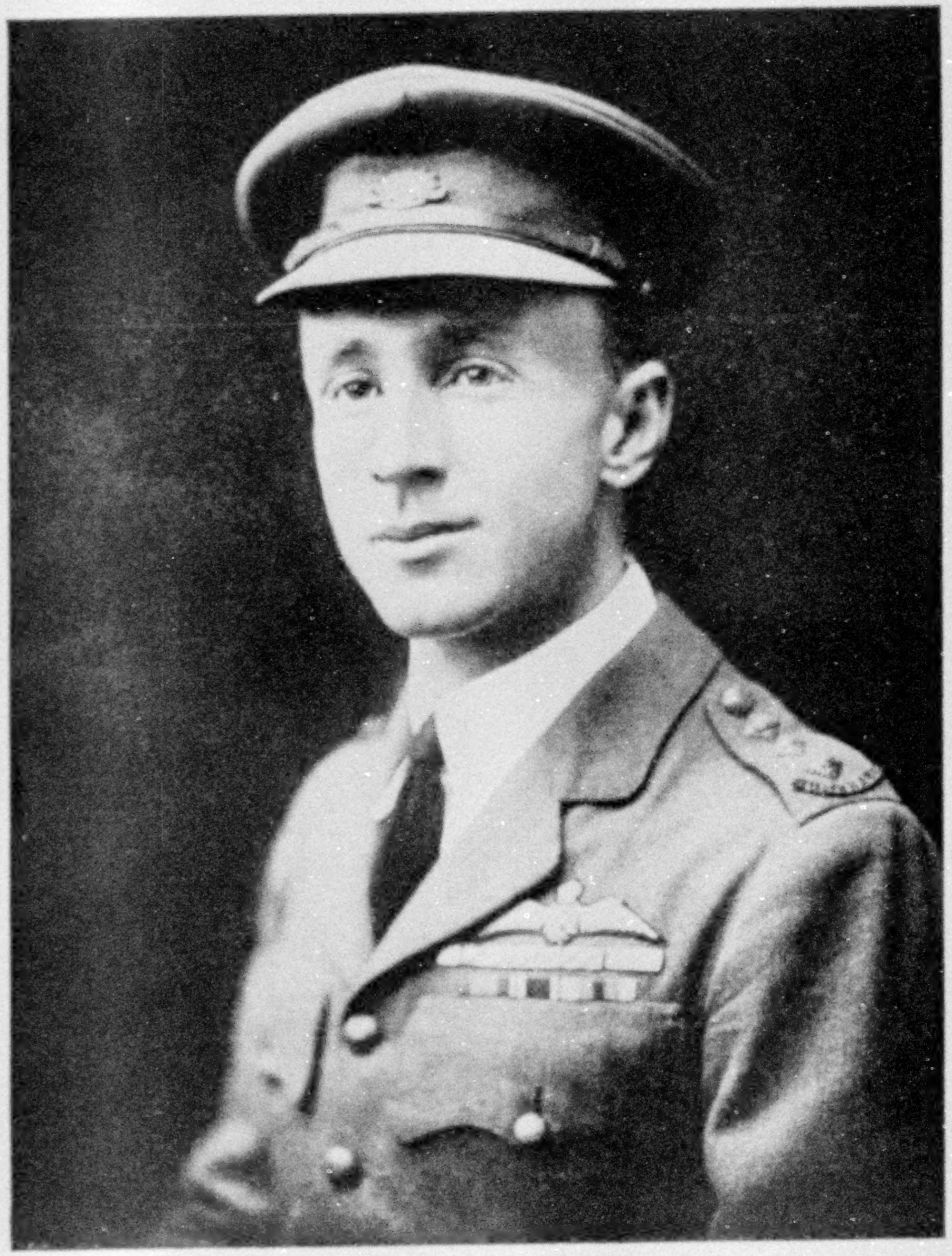
MAPPING OUT THE ROUTE

The route I decided upon was, roughly, England, France, Italy, Crete, Egypt, Palestine, Mesopotamia, Persia, India, Burma, Siam, Federated Malay States, Dutch East Indies to Port Darwin.

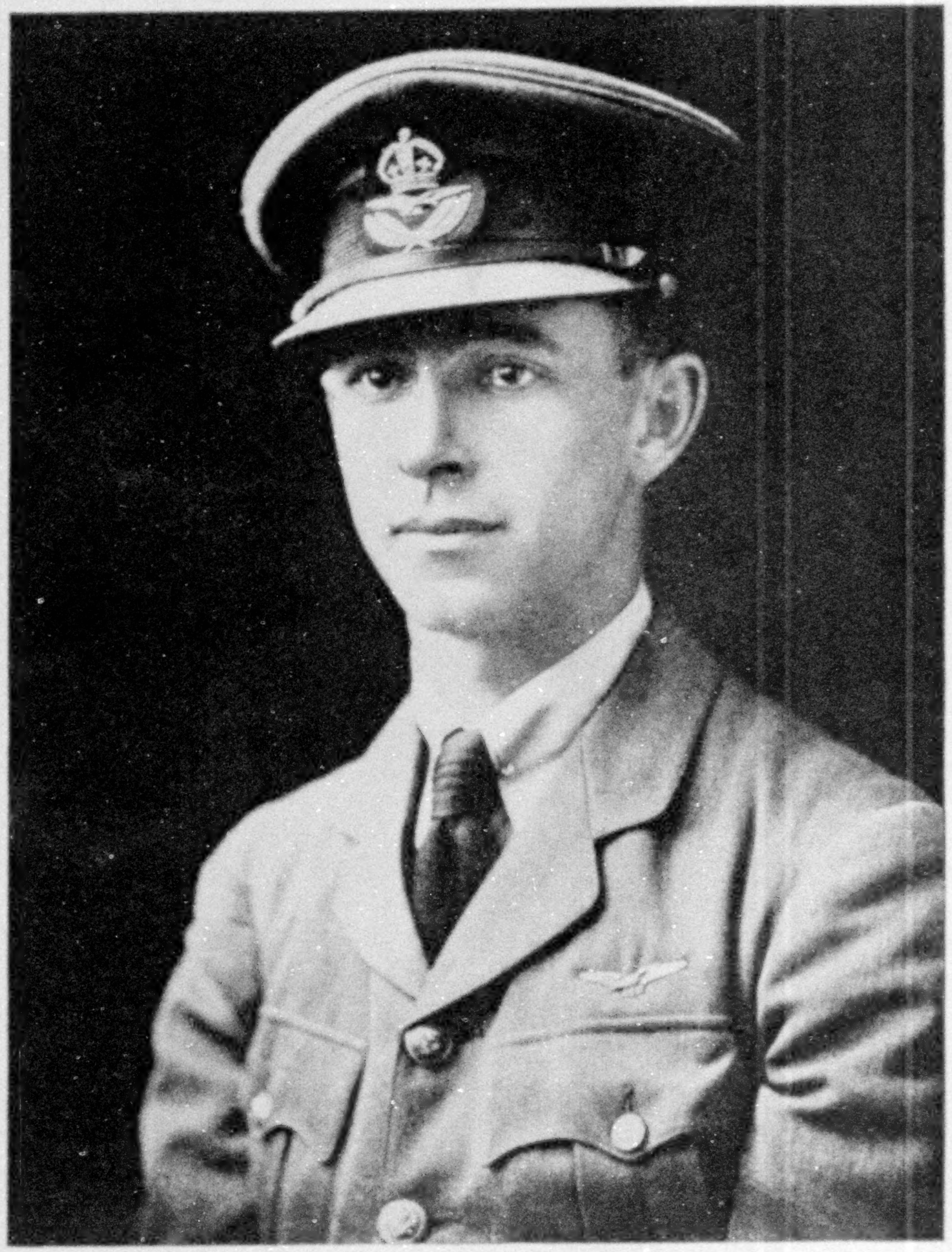
With the route from Port Darwin to our ultimate destination we were unconcerned, for we had received intimation that the Defense Department of Australia had made all necessary arrangements. The great thing was to reach Australia, and, if possible, land our machine there under thirty days.

For my convenience, I divided the route into four stages: First, London to Cairo; second, Cairo to Calcutta; third, Calcutta to Singapore; fourth, Singapore to Australia.

I had been over the entire route with the exception of the first stage, and so was fairly cognizant of the existing conditions—the weather, climate, and the nature of the landing grounds. General Borton had pioneered the first stage in August, 1918; his generous advice, directions, charts, and photographs were invaluable.



SIR ROSS SMITH, K. B. E., M. C., D. F. C., A. F. C., PILOT OF THE VIMY



THE SECOND IN COMMAND, SIR KEITH SMITH, K. B. E.

Sir Ross Smith selected his brother as assistant air pilot and navigator for the historic London-to-Australia flight. The former, during the World War, had been flying with the Australian Flying Squadron in Palestine, the latter with the Royal Air Force.

For the first two stages bad weather was my only apprehension.

As far as Calcutta, passable aërodromes existed, and I could rest assured of Royal Air Force assistance at almost every landing place.

From Calcutta onward we would be entirely dependent on our own arrangements. I considered these last two stages the most hazardous of the flight. Owing to the dense jungles and rough ground, landing places were few and far between, and even those at which we contemplated stopping were very small and unsuited to landing a big machine.

After leaving Calcutta, I proposed landing on the race-course at Rangoon, from which I would fly across the mountain ranges to the Siamese aërodrome at Bangkok. I then proposed to skirt southward down the coast of the Malay Peninsula to Singapore, where once more a landing would be made on a race-course.

The next stop would be made at the hangars of the Dutch Flying School, near Batavia. There would then be no further aërodromes until Port Darwin was reached, a distance of 1,750 miles. I knew that the Vickers Vimy was quite capable of carrying out a non-stop flight of that distance, for this had been demonstrated by the late Captain Sir John Alcock, K. B. E., D. S. C., on his famous transatlantic flight; but I was also aware that to attempt such a long flight with engines that by that time would have done over 100 hours running and covered nearly 10,000 miles would be much to expect.

I therefore decided that, in order to make more nearly certain my chances of success, an aërodrome must be constructed midway. General Borton had selected an admirable site at Bima, on the island of Sumbawa, in the Dutch East Indies. If a landing could be made there, the long stage of 1,750 miles would be halved and the possibility of success more than doubled.

A VALUABLE ALLY

When on my previous visit to Java, I had had the honor of a lengthy interview with His Excellency the Governor-General, Count Van Limberg Stirum, concerning the aërodromes which General Borton and I were selecting in the Netherlands Indies for the proposed aërial route to Australia. His Excellency was most enthusiastic over the development of commercial aviation, and I found him particularly well informed on all aërial matters. He also stated that any aërial route passing over the Netherlands Indies would receive his whole-hearted support and the assistance of his government.

In the course of the conversation I mentioned that I hoped, personally, to attempt the flight from England to Australia a few months later. He said that he would be gratified to assist in any capacity. Remembering this while in London, I decided to ask His Excellency if he would prepare an aërodrome at the selected site at Bima, and sent off a private cable.

LENGTH OF THE LONGEST NON-STOP STAGE REDUCED TO 1,000 MILES

Ten valuable days elapsed before I received a reply, but when it came I was overjoyed to learn that he was not only having Bima prepared, but also another aërodrome at Atambœa, in the island of Timor. This greatly eased my mind, for it meant that instead of having to accommodate our machine with a petrol capacity for 1,750 miles, we need only install tanks for a non-stop flight of 1,000 miles. This greatly added to the buoyancy of the machine, and, through the saving in space, to our personal comfort.

The machine was an ordinary Standard Vickers Vimy bomber, similar to that used by Sir John Alcock for the transatlantic flight, and, apart from the installing of an extra petrol tank, we made practically no alterations.

The machine was powered by two Rolls-Royce "Eagle VIII" engines, each of 360 horse-power. The wing-spread was a little over 67 feet and the total weight, loaded, was six and a half tons.

Vickers' factory, the home of the "Vimy," is at Weybridge, about 20 miles distant from London, and is built by the side of the famous Brooklands Motor-racing track. After completing the office work in London, the four of us moved to Weybridge and practically lived on the machine.

Photograph by Sir Ross Smith

THE MEN WHO KEPT THE ENGINES GOING, SERGEANT W. H. SHIERS AT THE LEFT AND SERGEANT J. M. BENNETT AT THE RIGHT

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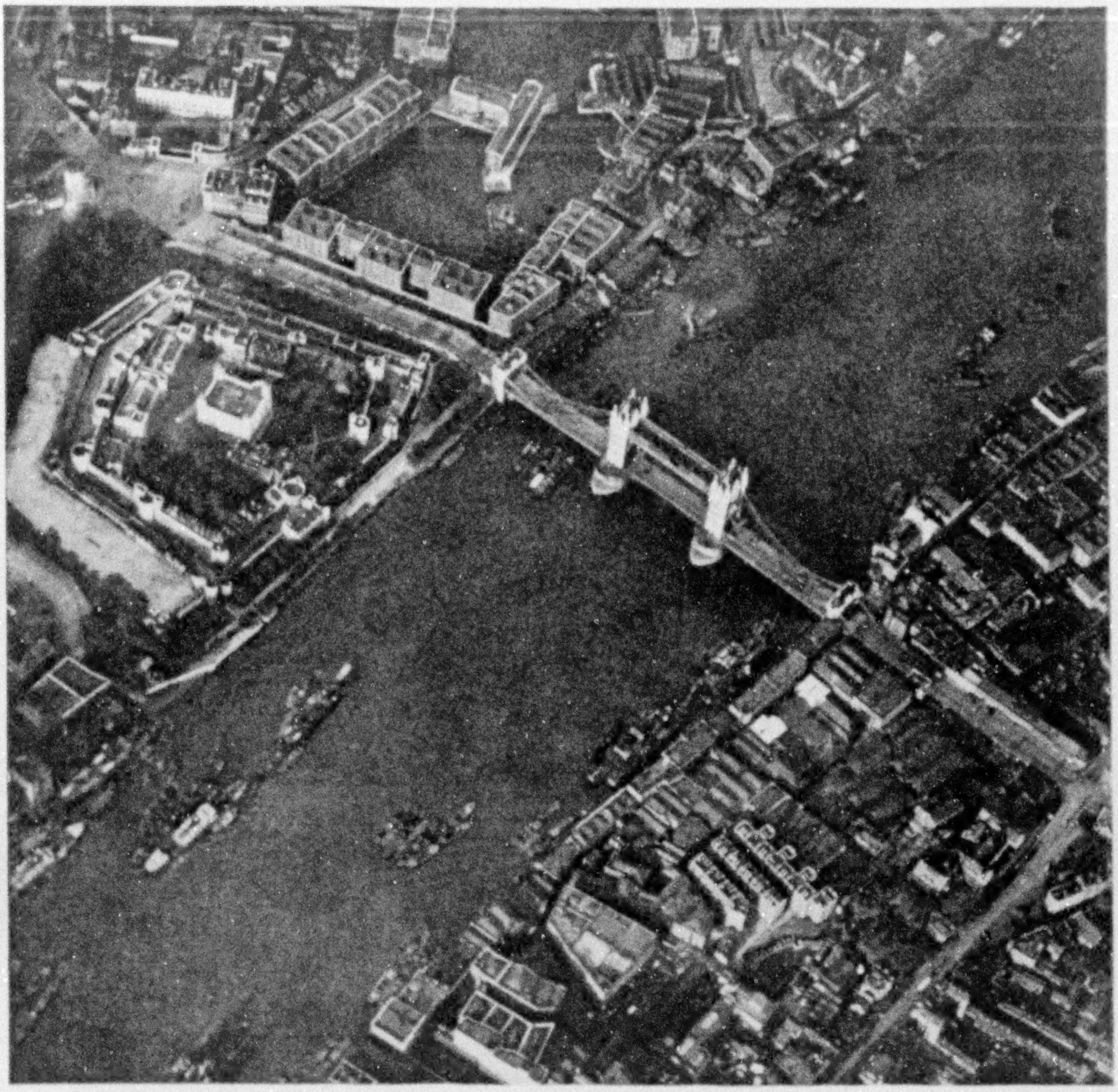

Photograph by Aerofilms, Limited

TOWER BRIDGE AND THE TOWER OF LONDON FROM AN ELEVATION OF 5,000 FEET

The fitting, testing, and final adjusting were thoroughly interesting, and great enthusiasm was shown by the employees of Vickers. It was gratifying to observe that these same men and women, who had produced the great machine flown by Sir John Alcock, felt that their efforts were something more than mere labor. They were producing an ideal from their factory to uphold national prestige. Every man and woman did his or her best, and wished us God-speed.

Thus we were able to place the deepest confidence in the machine; we feared no frailties in its manufacture, and hundreds of times during the flight we had occasion to pay tribute to and praise the sterling efforts of those British workers.

Our petrol capacity would carry us for 13 hours at a cruising speed of 80 miles an hour—ample for the longest stages between aërodromes.

CUTTING DOWN THE BAGGAGE

The question of "spares" was of vital importance and one into which I had previously gone minutely. As we intended starting almost immediately, I decided that it would be useless to ship "spares" ahead, so that the only course left was to carry them with us. This added considerably to the weight of the machine; but the absence of a certain spare part, should we require it, might delay us for weeks, and so put us out of the competition.

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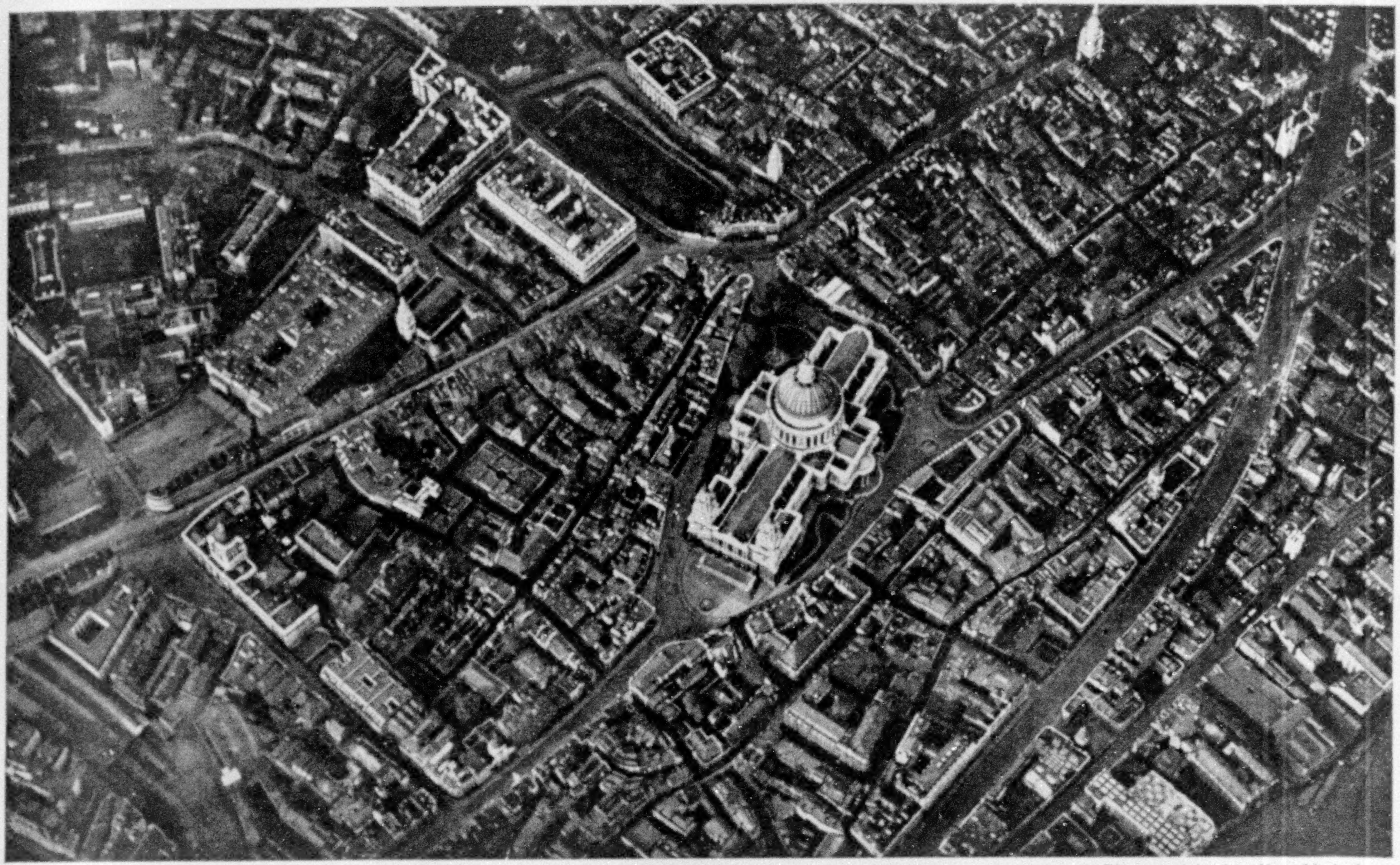


Photograph by Aerofilms, Limited

ST. PAUL'S CATHEDRAL, LONDON, AS SEEN FROM THE AIR

Owing to the fact that this magnificent architectural pile, a monument to the genius of Sir Christopher Wren, is so hedged about by smaller buildings, it remained for aërial photography to give the world a correct conception of the dignity and impressiveness of its exterior.

Eventually the spare parts, personal kit, and miscellaneous gear were assembled and weighed. I decided to limit the total weight of our machine when fully loaded to 13,000 pounds.

I was aware that the deadweight of Sir John Alcock's machine in the transatlantic flight was over 14,000 pounds, but in the vastly greater distance that lay before us, I intended to give my engines as little work as possible.

We discovered that, after the "weighing in," there was an excess of 300 pounds; so something had to go. Our "spares" were indispensable, and so we drastically attacked our personal kit. It was easy enough to cut down our kit—so soon as we were unanimous in deciding to go without any—and so it eventuated that we left England in the garments we wore and with the proverbial toothbrush apiece.

As my brother was navigator, all arrangements concerning maps, etc., were left entirely to him. Wherever possible, we would fly our course by maps and direct observations of features on the ground; but when cloudy or misty weather rendered terrestrial observation obscure, we would rely solely on navigation. For this purpose we carried an Admiralty compass, a ground-speed and drift indicator, and we had our own flying experience to fall back on.

DELAYED BY WEATHER

The machine was at last ready, and, after being flown and tested by Sir John Alcock, was pronounced fit for the undertaking. I considered it advisable to remain another week in England in order to give our supplies of fuel and oil sufficient time to reach some of the more remote aërodromes.

It was galling to have to idle in England while every day we read in the press of the progress of Monsieur Poulet, who had left Paris on October 14 and had by now reached Mesopotamia. The Sopwith machine, piloted by Captain Mathews, had also left England some time previously.

The weather during this week's stay was abominable. Winter was fast closing in with typical English November fogs. Driving sleet and pelting rains fell almost without intermission. One afternoon there was a brief lull, and I managed to get the machine into the air for about an hour and make a final test.

Our machine was still at Weybridge, and the official starting place for the competitive flight was the Hounslow aërodrome.

"WE'RE OFF!"

I had intended flying over to Hounslow on November 13 and starting off on the flight the following morning. On November 11 we were pottering around our machine when the rain suddenly ceased and the fog lifted. It was too good an opportunity to miss! We ran the machine out of its hangar, and I was just about to start up when the clouds closed down again and snow fell heavily.

The weather was very capricious, for in half an hour the clouds rolled away, clearing the air and giving promise of a bright, fine evening. The engines were started up, we climbed into our seats, and took off from Weybridge. As far as we were concerned, the flight to Australia had begun!

During the voyage to Hounslow the machine in every part worked to my entire satisfaction and we landed at the official starting ground without difficulty.

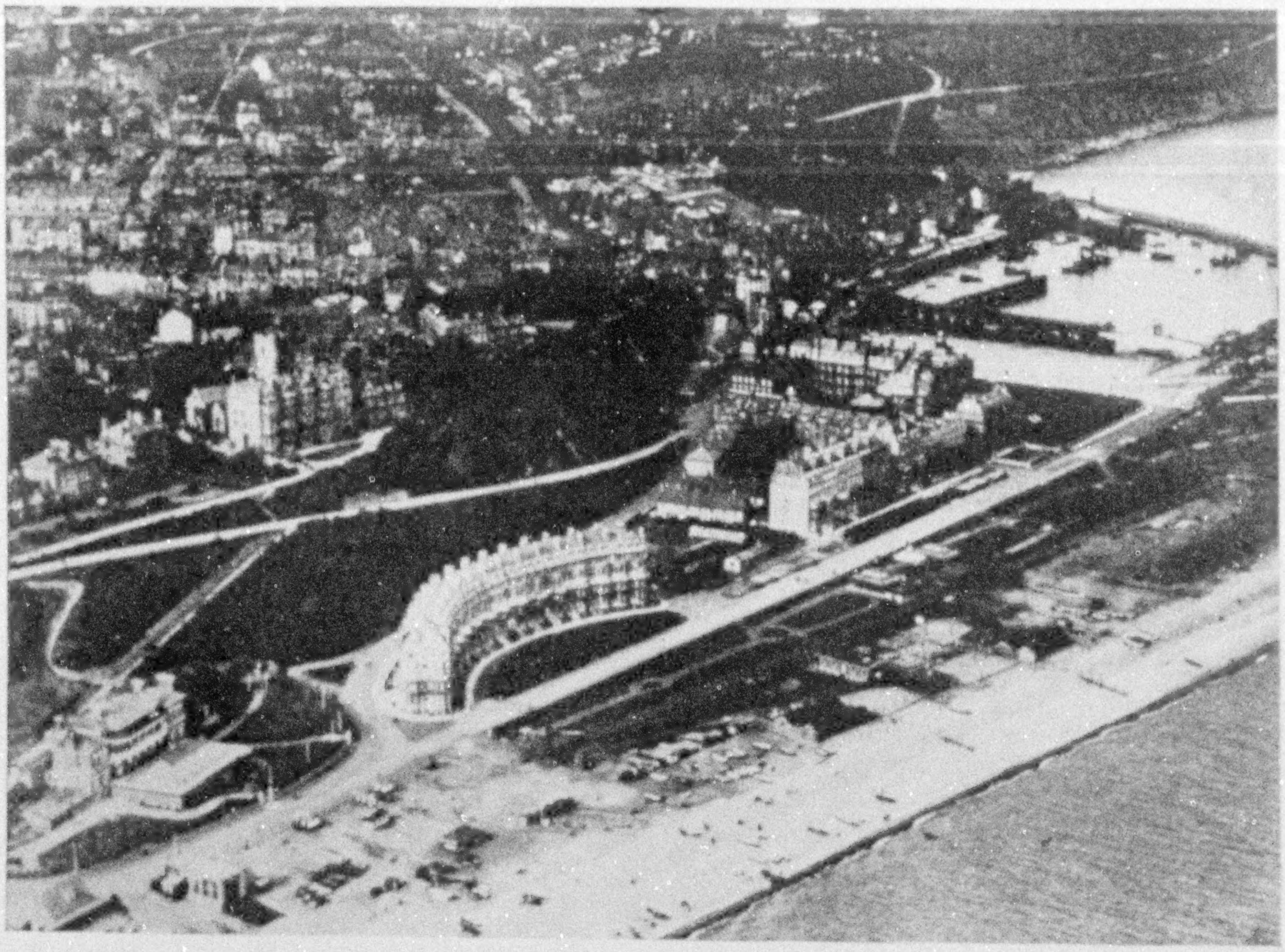
Hounslow is the main "civilian" aërodrome of London, and all commercial machines inward and outward bound from or to the continent start from or land there.

So soon as the machine was in its hangar, I got in touch with Vickers and informed them that I intended starting next morning.

On the morning of November 12 we were called at 4.30, and I was delighted to find a clear, frosty morning. However, at 6.30 a dense ground haze appeared, and weather reports sent by the Air Ministry forecasted bad weather in the southeast of London and the north of France.

The machine was run out from the hangars and Commander Perrin, of the Royal Aëro Club, marked and sealed five parts of it, in accordance with the rules of the competition. It was necessary to produce three of the marked parts upon arrival in Australia, in order to identify the machine.

At 8 o'clock another report stated that



Photograph by Aerofilms, Limited

FOLKESTONE, ON THE STRAIT OF DOVER, AS SEEN FROM THE AIR

Immediately after leaving the flying field at Hounslow, the starting point in the London-to-Australia flight, the world below was lost in fog, but just before reaching the outskirts of Folkestone a rift in the mist enabled the aviators to catch a farewell glimpse of English shores (see text below).

the forecast was Class V, or totally unfit for flying. This was not very reassuring, but our minds were made up and, come fair, come foul, we were determined to start.

A few friends had gathered to bid us God-speed, and, with their kindly expressions and cheers sounding in our ears, we climbed into our seats and took off from the snow-covered aërodrome.

THE RACE BEGINS IN EARNEST

We climbed slowly upward through the cheerless, mist-laden skies, our engines well throttled back and running perfectly. So as to make sure that all was in thorough working order, we circled for ten minutes above Hounslow, then set off.

At 2,000 feet we suddenly emerged from the fog belt into brilliant sunshine, but the world below was lost to sight, screened by the dense pall of mist. Accordingly, we set a compass course for Folkestone, and just before reaching the outskirts a rift in the mists enabled us to pick up the grand old coast-line, every inch of which is measured by history; and so we checked our bearings.

GOOD-BYE, OLD ENGLAND!

There was a certain amount of sentiment, mingled with regrets, in leaving old England, the land of our fathers. Stormy seas were sweeping up channel, lashing white foam against the gaunt, gray cliffs that peered through the mists in the winter light, phantom-like and unreal.

The frigid breath of winter stung our faces and chilled us through; its garb of white had fallen across the land, making the prospect inexpressibly drear. The roadways, etched in dark relief, stood out like pencil-lines on the snow-clad landscape, all converging on Folkestone.

I looked over the side as the town itself, which had played such an important

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part in the war, came under us. Thither the legions of the Empire, in ceaseless tides, had passed to and from the grim red fields of East and West, all acclaiming thy might, great land of our fathers!

It seemed hard to realize that we had at last started out on the long flight for which we had been planning and working so long, and as I glanced over the machine and the instruments, I wondered what the issue of it all might be—if the fates would be so kind as to smile on us ever so little and allow us to reach the goal of our ambitions, Australia, in thirty days.

The machine was flying stately and steady as a rock. All the bracing wires were tuned to a nicety; the dope on the huge planes glinted and glistened in the sunlight; I was filled with admiration. The engines, which were throttled down to about three-quarters of their possible speed, had settled down to their task and were purring away in perfect unison and harmony.

THE JOY OF FLYING

A small machine is ideal for short flights, joy riding the heavens, or sightseeing among the clouds; but there is something more majestic and stable about the big bombers which a pilot begins to love. An exquisite community grows up between machine and pilot; each, as it were, merges into the other. The machine is rudimentary and the pilot the intellectual force. The levers and controls are the nervous system of the machine, through which the will of the pilot may be expressed—and expressed to an infinitely fine degree. A flying-machine is something entirely apart from and above all other contrivances of man's ingenuity.

The aëroplane is the nearest thing to animate life that man has created. In the air a machine ceases indeed to be a mere piece of mechanism; it becomes animate and is capable not only of primary guidance and control, but actually of expressing a pilot's temperament.

The lungs of the machine, its engines, are again the crux of man's wisdom. Their marvelous reliability and great intricacy are almost as awesome as the human anatomy. When both engines are going well and synchronized to the same speed, the roar of the exhausts develops into one long-sustained rhythmical boom—boom—boom. It is a song of pleasant harmony to the pilot, a duet of contentment that sings of perfect firing in both engines and says that all is well.

This melody of power boomed pleasantly in my ears, and my mind sought to probe the inscrutable future, as we swept over the coast of England at 90 miles per hour.

THE WEATHER PROPHET

And then the sun came out brightly and the channel, all flecked with white tops, spread beneath us. Two torpedo-boats, looking like toys, went northward. And now, midway, how narrow and constricted the straits appeared, with the gray-white cliffs of old England growing misty behind, and ahead—Gris Nez—France, growing in detail each moment!

The weather was glorious, and I was beginning to think that the official prophet, who had predicted bad conditions at our start, was fallible after all. It was not until we reached the coast of France that the oracle justified itself; for, stretching away as far as we could see, there lay a sea of cloud. Thinking it might be only a local belt, we plunged into the compacted margin, only to discover a dense wall of nimbus cloud, heavily surcharged with snow.

The machine speedily became deluged by sleet and snow. It clotted up our goggles and the wind screen and covered our faces with a mushy, semi-frozen mask.

Advance was impossible, and so we turned the machine about and came out into the bright sunshine again.

We were then flying at 4,000 feet, and the clouds were so densely compacted as to appear like mighty snow cliffs, towering miles into the air. There was no gap or pass anywhere, so I shut off the engines and glided down, hoping to fly under them. Below the clouds snow was falling heavily, blotting out all observation beyond a few yards.

HOW AN AËRIAL COURSE IS SET

Once more we became frozen up, and, as our low elevation made flying extremely hazardous and availed us noth-

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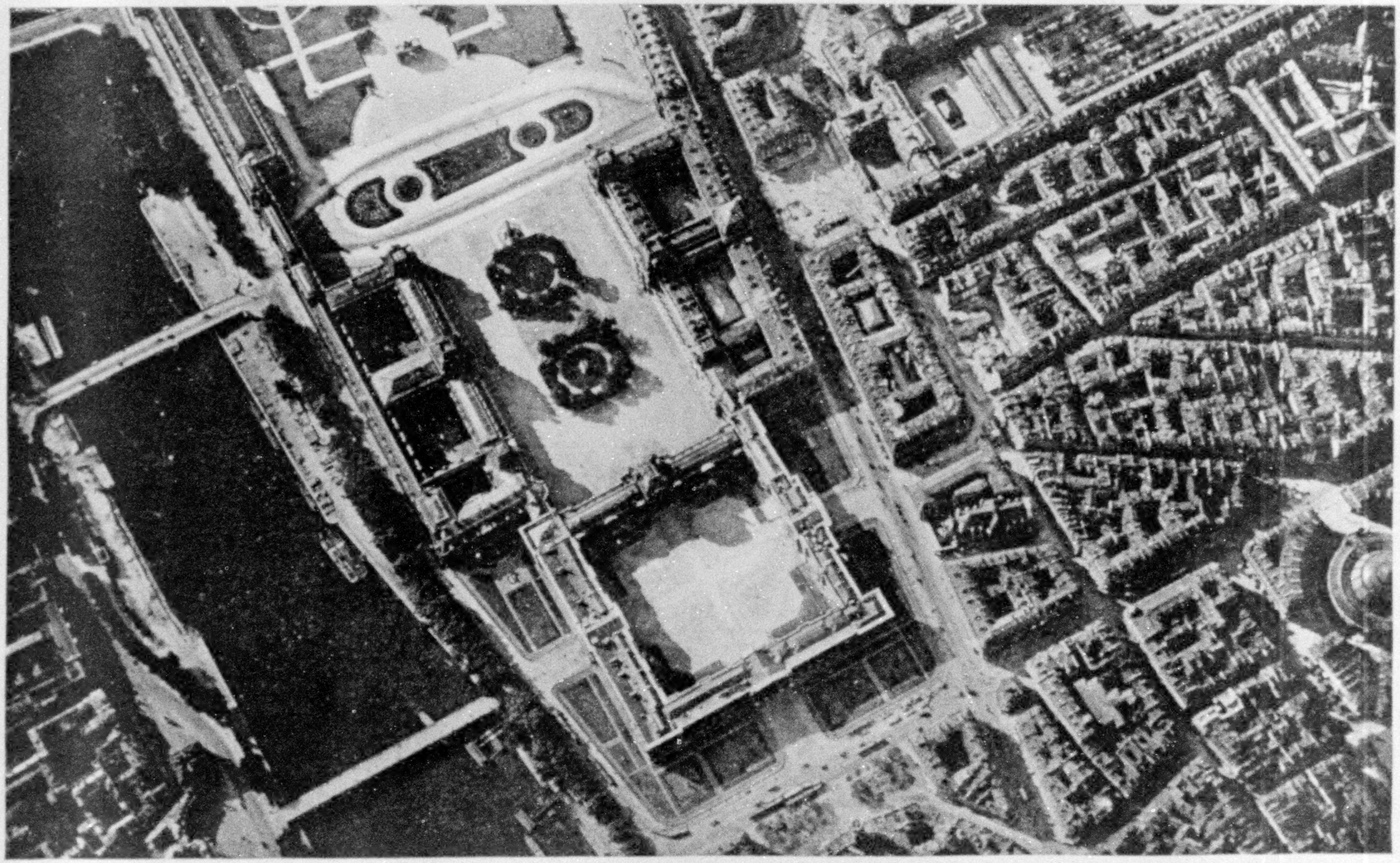

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THE HEART OF PARIS AS SEEN FROM THE AIR

In the center of the photograph is the Louvre and one end of the court of the Tuileries. At the left is the dark band of the River Seine, with three of its bridges. The building with the dome, to the right, is the Bourse du Commerce. In the upper right corner is the Palais Royal. A blinding snowstorm obscured the cities and landscape of France from the pilot of the Vimy from the time he crossed the English Channel until he came from above the clouds at Roanne, near Lyons, the first landing place (see text, pages 243-245).

ing, I determined to climb above the cloud-mass and, once above it, set a compass course for Lyons.

Aërial navigation is similar to navigation at sea, excepting that the indispensable sextant is of little use in the air, owing to the high speed of travel and the consequent rapid change from place to place and for other technical reasons. Allowances have also to be made for the drift of the machine when side winds are blowing—an extremely difficult factor to determine accurately.

As the medium on which the machine travels is air, any active motion of that medium must necessarily have a direct influence on the machine. If, for instance, the medium on which we are traveling is a wind of 40 miles per hour, blowing directly toward our destination, and the velocity of the machine is 80 miles per hour, then the speed which the machine will travel in relation to the ground would be 120 miles per hour. If we had to forge directly ahead into the same wind, then our speed would obviously be only 40 miles per hour.

To determine the speed of a machine in relation to the ground, an instrument is fitted, called a ground-speed indicator. In side winds the machine makes leeway in addition to its forward movement, and it is the ratio of the one to the other that provides the greatest problem of aërial navigation, especially when flying above clouds or when land features are obscured.

On this particular occasion the Air Ministry had furnished us with charts indicating the trend of the winds and their approximate force at various altitudes, and so we knew, roughly, what allowances to make in our dead reckoning if we lost sight of the ground.

INTO CLOUDLAND

So we climbed steadily in a wide, ascending spiral, until we reached an altitude of 9,000 feet, and were then just above the clouds. Below us the snowstorm raged, but we had entered another world—a strange world, all our own, with bright, dazzling sunshine.

It might have been a vision of the polar regions; it undoubtedly felt like it. The mighty cloud ocean over which we were scudding resembled a polar landscape covered with snow. The rounded cloud contours might have been the domes of snow-merged summits. It was hard to conceive that that amorphous expanse was not actual, solid. Here and there flocculent towers and ramps heaved up, piled like mighty snow dumps, toppling and crushing into one another. Everything was so tremendous, so vast, that one's sense of proportion swayed uncontrolled.

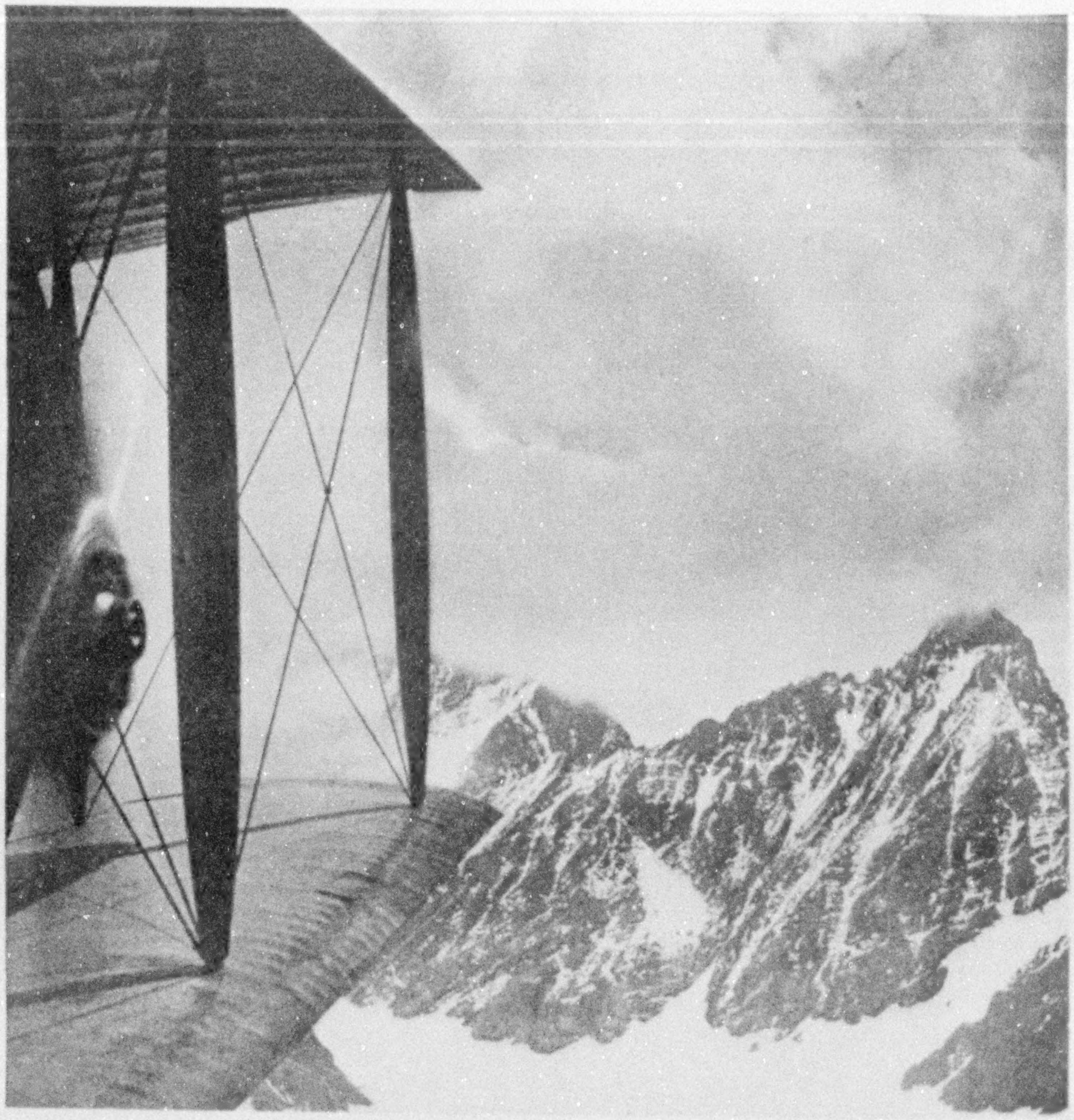
Then there were tiny wisps, more delicate and frail than feathers. Chasms thousands of feet deep, sheer columns, and banks extended almost beyond eye-reach. Between us and the sun stretched isolated towers of cumulus, thrown up as if erupted from the chaos below. The sunlight, filtering through their shapeless bulk, was scattered into every conceivable gradation and shade in monotone. Round the margins the sun's rays played, outlining all with edgings of silver.

A BEWILDERING SCENE

The scene was one of utter bewilderment and extravagance. Below, the shadow of our machine pursued us, skipping from crest to crest, jumping gulfs and ridges like a bewitched phantom. Around the shadow circled a gorgeous halo, a complete flat rainbow. I have never seen anything in all my life so unreal as the solitudes of this upper world through which my companions and I were now fleeting.

My brother worked out our course, and I headed the machine on to the compass bearing for Lyons; and so away we went, riding the silver-edged sea and chased by our dancing shadow. For three hours we had no glimpse of the earth, so we navigated solely by our compass, hoping eventually to run into clear weather, or at least a break in the cloud, so that we might check our position from the world below. My brother marked our assumed position off on the chart, by dead reckoning, every fifteen minutes.

The cold grew more intense. Our hands and feet lost all feeling and our bodies became well-nigh frozen. The icy wind penetrated our thick clothing and it was with greatest difficulty that I could work the machine. Our breaths con-



Photograph by Sir Ross Smith

CROSSING THE SOUTHERN ALPS

"Eastward the Alps reared up, serrating the horizon with a maze of glistening snow-peaks" (see text, page 253).

densed on our faces and face-masks and iced up our goggles and our helmets.

Occasionally immense cloud barriers rose high above the lower cloud strata, and there was no circumventing them; these barriers were invariably charged with snow, and as I plunged the machine into them, the wings and fuselage were quickly armored with ice. Our air-speed indicator became choked, and we ourselves were soon covered white by an accumulating layer of driving snow.

Goggles were useless, owing to the ice, and we suffered much agony through being compelled to keep a lookout with unprotected eyes—straining into the 90-miles-an-hour snow-blast.

A FROZEN LUNCH

About 1 p. m. I suggested to my brother that we should have some sandwiches for lunch. On taking them from the cupboard we discovered they were frozen hard. Fortunately, we carried a thermos flask of hot coffee, and the *pièce de résistance* was a few sticks of chocolate, which was part of our emergency rations. I have never felt so cold or miserable in my life as I did during those few hours. My diary is terse, if not explicit:

"This sort of flying is a rotten game. The cold is hell, and I am a silly ass for having ever embarked on the flight."

To add to our discomfort and anxiety, we were quite uncertain as to our location, and I had visions of what would happen if we encountered a heavy side wind and got blown into the wild Atlantic.

The only really cheerful objects of the whole outfit were our two engines. They roared away and sang a deep-throated song, filled with contentment and gladness; it did not worry them that their radiator blinds, which we kept shut, were thickly coated with frozen snow.

I regarded those engines with envy. They had nice hot water circulating around them, and well, indeed, they might be happy. It seemed anomalous, too, that those engines needed water flowing around their cylinders to keep them cool, while we were sitting just a few feet away semi-frozen. I was envious! I have often thought of that day since and smiled about i[illegible] that diary entry, and at my allusion to the two engines and my envy of their warmth.

The situation was becoming desperate. My limbs were so dead with cold that the machine was almost getting beyond my control. We must check our position and find out where we were at any cost.

A PASSAGE THROUGH THE CLOUDS

Ahead loomed up a beautiful dome-shaped cloud, lined with silver edges. It was symbolical; and when all seemed dark, this rekindled in me the spark of hope. By the side of the "cloud with the silver lining" there extended a gulf about two miles across. As we burst out over it I looked down into its abysmal depths.

At the bottom lay the world. As far as the eye could reach, in every direction stretched the illimitable cloud sea, and the only break now lay beneath us. It resembled a tremendous crater, with sides clean cut as a shaft. Down this wonderful cloud avenue I headed the Vimy, slowly descending in a wide spiral. The escape through this marvelous gateway, seven thousand feet deep, that seemed to link the realms of the infinite with the lower world of mortals, was the most soul-stirring episode of the whole voyage.

Snow was falling heavily from the clouds that encircled us, yet down, down we went in an almost snow-free atmosphere. The omen was good; fair Fortune rode with us. The landscape was covered deep in snow, but we picked out a fairly large town, which my brother at once said was Roanne. This indicated that we were directly on our route; but it seemed too good to be true, for we had been flying at over 80 miles per hour for three hours by "blind navigation," and had been unable to check our course.

THE END OF THE FIRST LAP

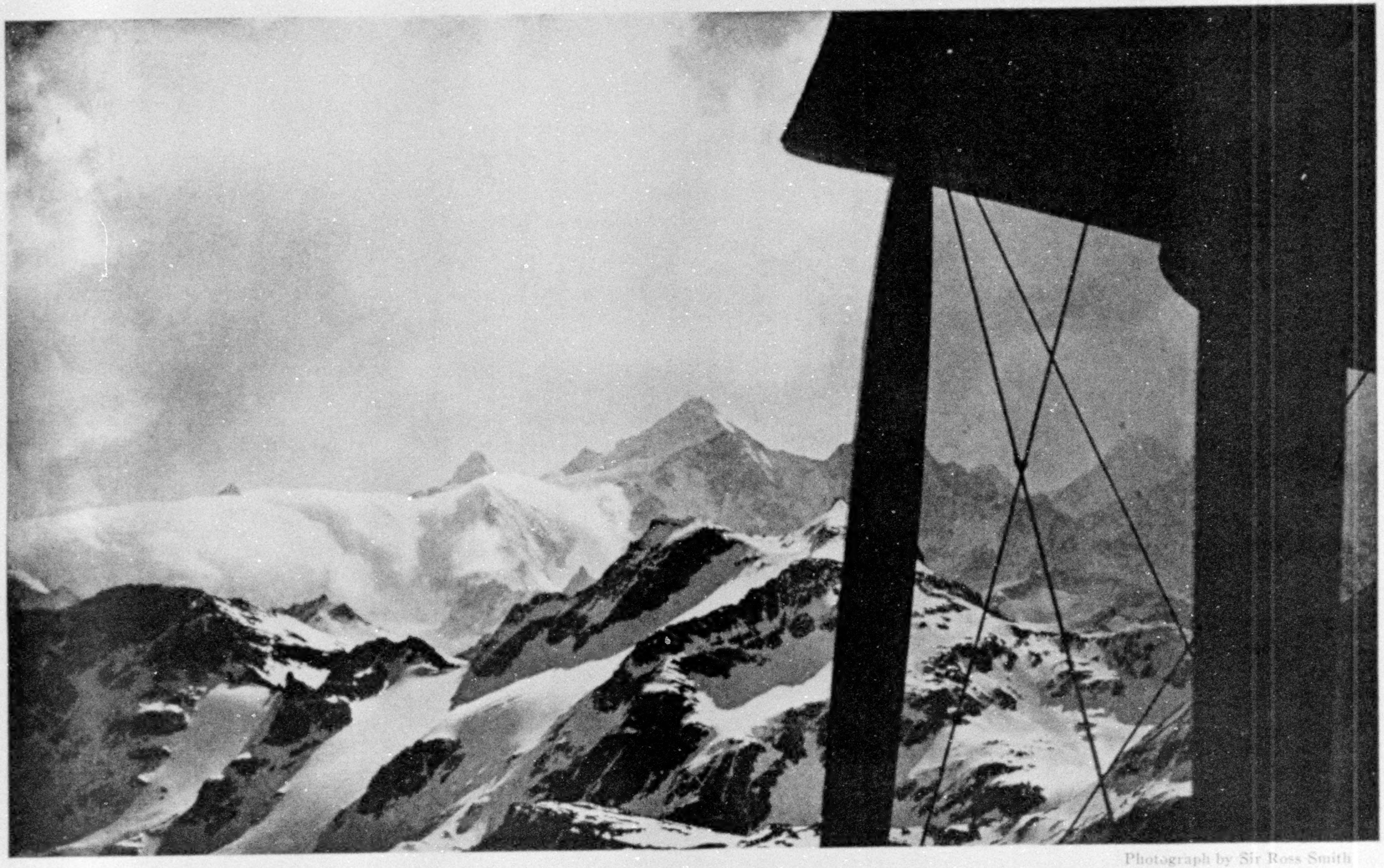
At 1,000 feet I circled above the town. Our maps informed us it was Roanne! Lyons, our destination, was only 40 miles away. Exquisitely indeed is the human mind constituted; for, now that we knew where we were, we all experienced that strange mental stimulus—the reaction, after mental anxiety and physical tribulation. We forgot the cold, the snow, the gloom; everything grew bright and warm with the flame of hope and success. And so eventually we reached Lyons and landed.

I have always regarded the journey from Hounslow to Lyons as the worst stage of the flight, on account of the winter weather conditions. We had flown 510 miles on a day officially reported "unfit for all flying." Furthermore, we had convinced ourselves that, by careful navigation, we could fly anywhere in any sort of weather, and, what was still more, we had gained absolute confidence in our machine and engines.

We were so stiff with cold when we climbed out of the machine that we could hardly walk. But what did it matter? Our spirits ran high; we had covered the worst stage; the past would soon be forgotten, and new adventures lay awaiting us in the near, the rosy, future.

The French flying officers were very surprised when they learned we had come from London. They looked up at the weather, at the machine, then at us, and slowly shook their heads. It was an eloquent, silent expression. They were still more surprised when they learned that we intended leaving for Rome the next morning.

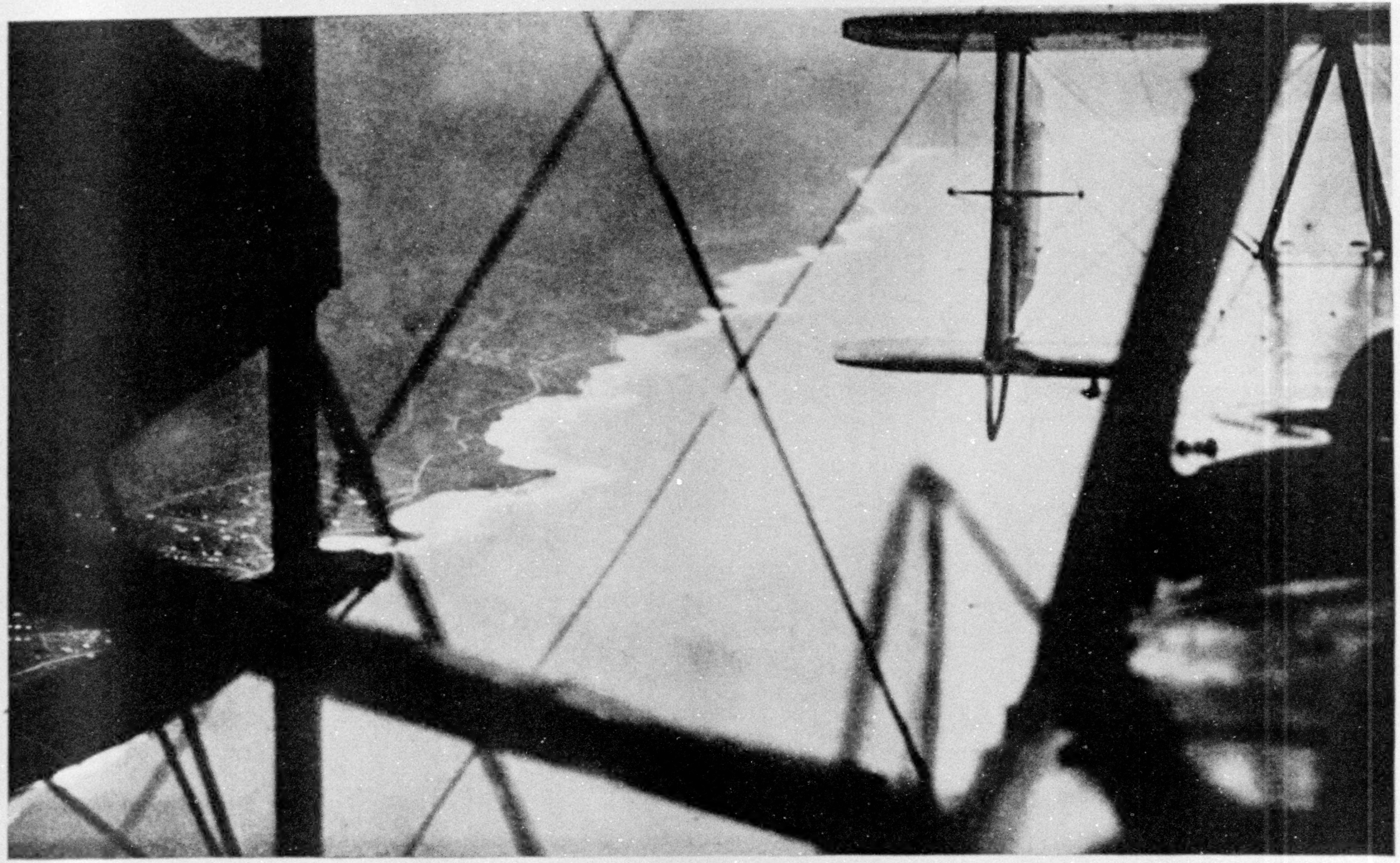
Not one of us could speak French very



Photograph by Sir Ross Smith

SEAS OF CLOUDS FILLED THE VALLEYS OF THE SOUTHERN ALPS

"Innumerable rocky pinnacles piercing through gave the whole scene the appearance of a rock-torn surf." In the flight from Lyons to Pisa the Vimy was piloted across the River Durance, above the city of Aix, and over the French and Italian Riviera.



Photograph by Sir Ross Smith

A GLIMPSE OF THE RIVIERA: NATURE'S GREAT MAP UNROLLED

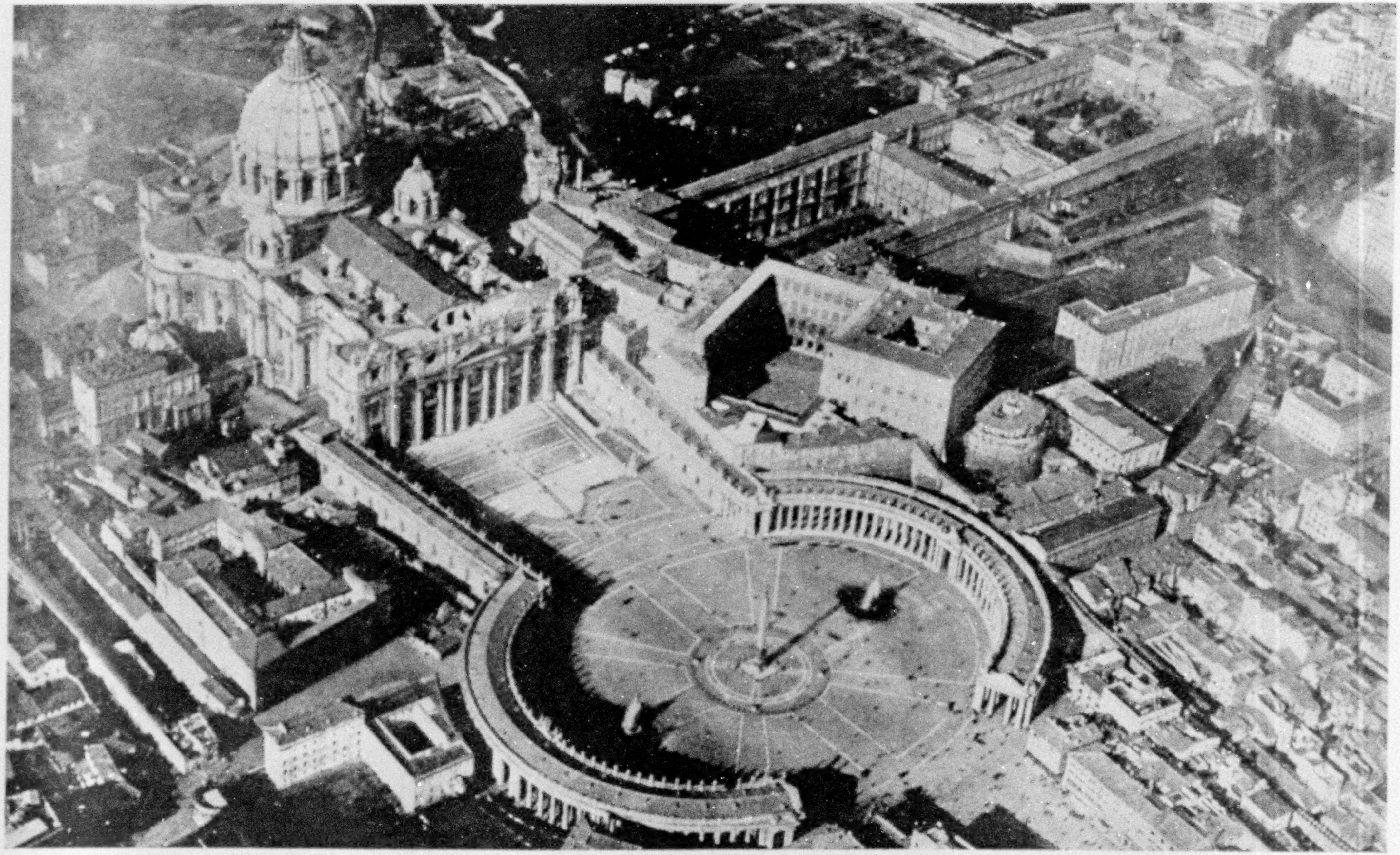
"Five thousand feet below us the Mediterranean was laving the cliffs of innumerable little bays and inlets, embroidering a thin white edging of surf round their rugged bases—a narrow white boundary separating green-topped cliffs from deep-blue waters" (see text, page 253).

XUM

Photograph by Earle Harrison

MONTE CARLO AND THE CASINO

There seemed to be no suitable place for landing here, however, so the aviators had to forego the desire to test Dame Fortune and see if she would be as kind to them at the tables as in the air.



Photograph from Press Illustrating Service

THE ETERNAL CITY AND THE MOST FAMOUS CHRISTIAN CHURCH AS PHOTOGRAPHED BY A MODERN SKY PILOT

The majestic dome of St. Peter's in Rome overlooks the Vatican. From the elevation at which this picture was made, the piazza, with its obelisk, resembles a great sun-dial.

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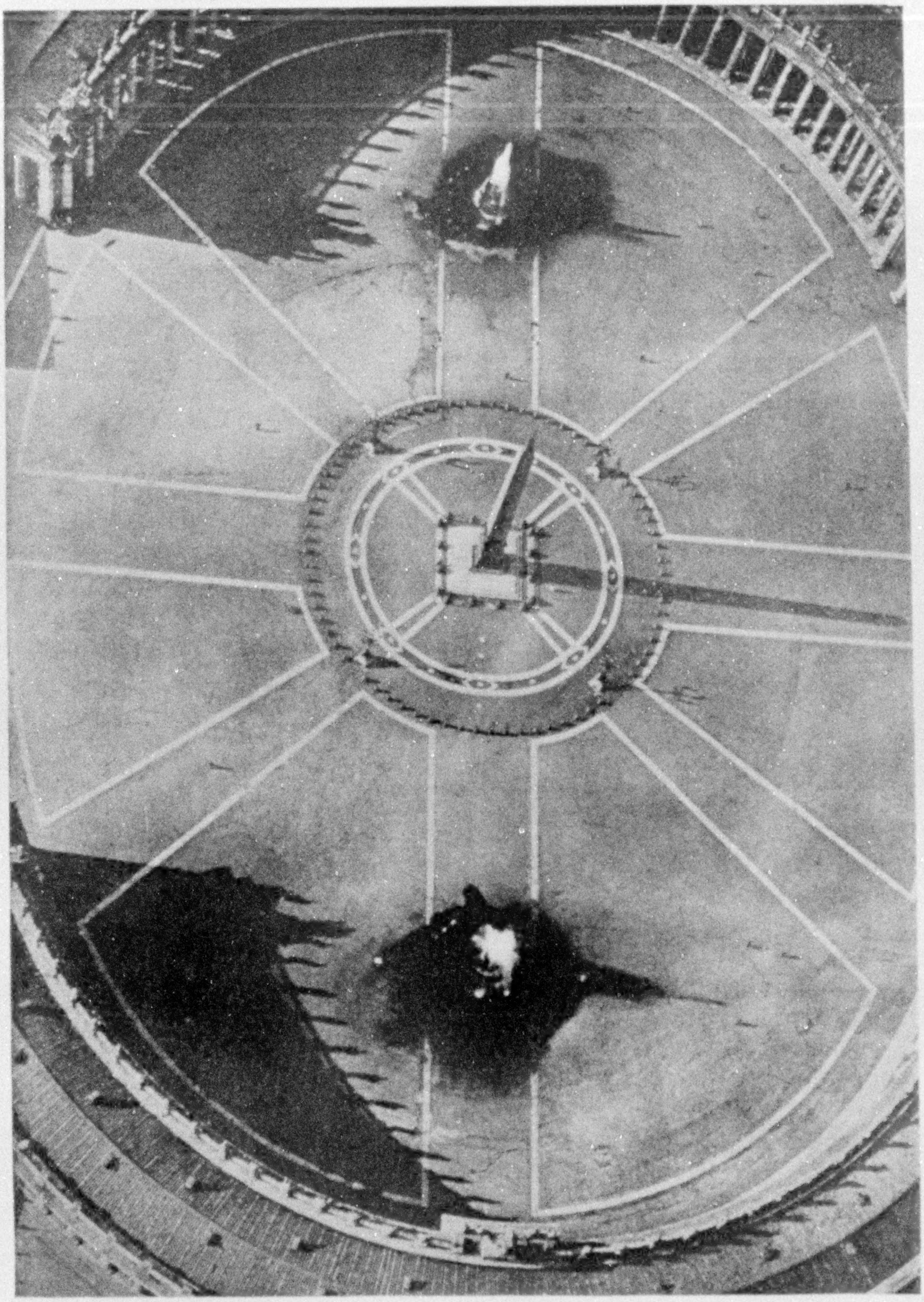
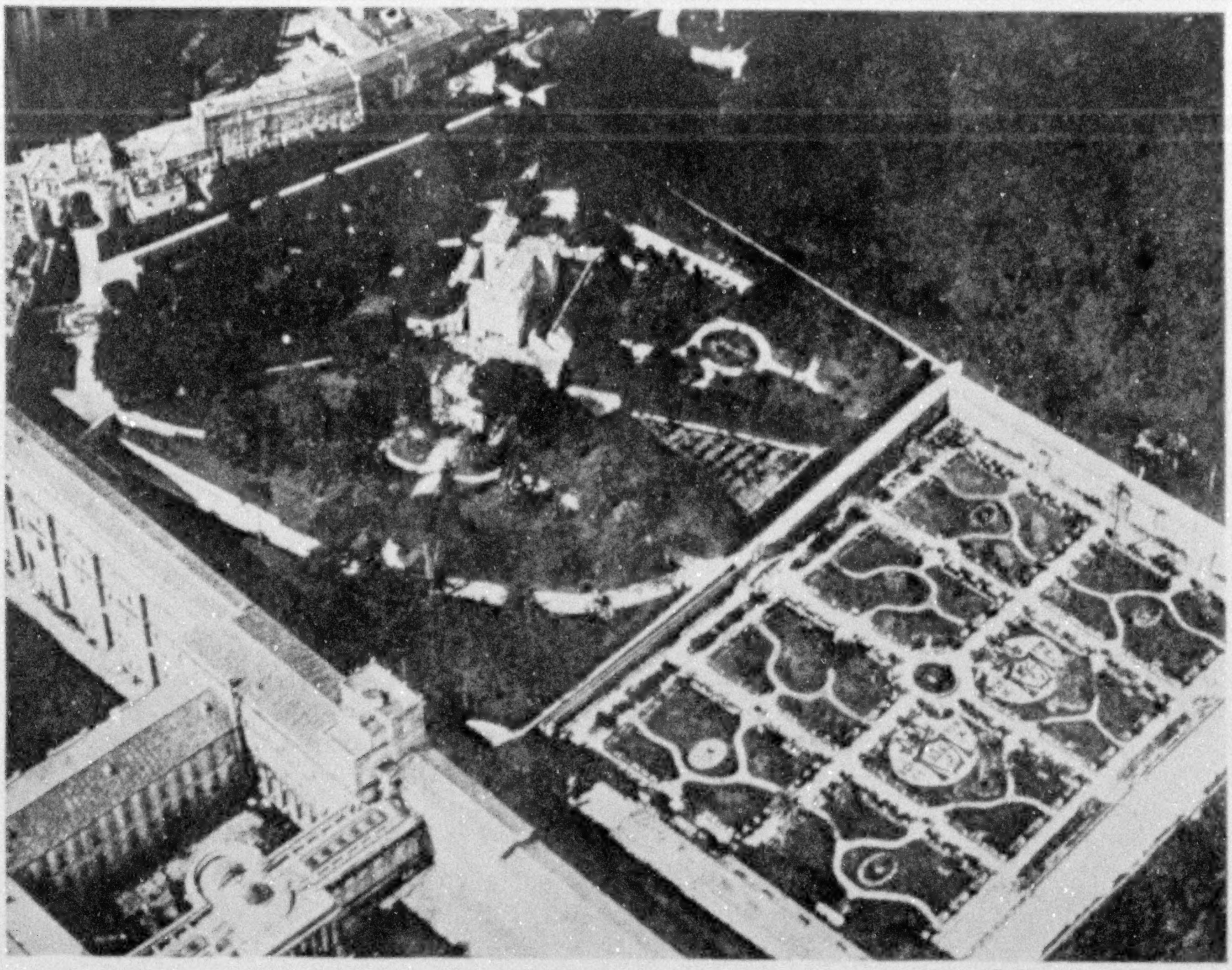


© Kadel and Herbert

BEAUTIFUL ROME PHOTOGRAPHED FROM THE AIR; LOOKING DOWN ON THE FAMOUS OBELISK IN THE CENTER OF THE PIAZZA OF ST. PETER'S

Tradition tells us that when the obelisk was being erected on the present site, in 1586, the engineer, Fontana, failed to take into consideration the tension which would result from the great weight (320 tons) on the elevating ropes. As a consequence, the monolith just failed of being raised to a vertical position. At this critical moment, although silence had been imposed upon the bystanders under pain of death, one of the workmen, Bresca, a sailor, cried, "Wet the ropes!" This was done, causing a shrinkage and thus preventing a catastrophe.



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THE PAPAL RESIDENCE AND GARDENS IN ROME

At the right can be seen the insignia of Pope Pius X and Pope Benedict XV.

well, and we had considerable difficulty in arranging for petrol supplies to be delivered to the machine by next morning. Sergeants Bennett and Shiers just had time to look over the engines before the winter darkness settled down. We all turned into bed very early, very tired, but very happy.

On opening my personal kit that night I found it, too, had suffered the rigors of the sky journey. It was still frozen stiff—my solitary tooth-brush!

THE SECOND DAY OPENS

Next morning was November 13. I always hold that such a date should be banned from the months of the calendar. Daylight 6.30, cold and frosty. The petrol had not arrived at the machine, so I sent my brother Keith in search of it; his French was even less eloquent than mine. A couple of hours later he returned, looking very grim, followed by 300 gallons of very servile spirit.

I explained in execrable French to a mechanic that I required 24 gallons of hot water for our radiators. It had been necessary to drain the water from the radiators the night before, owing to the low temperature; otherwise the circulating water would have frozen into a solid block and burst the radiators. Ten minutes later the mechanic returned bearing a small jug of hot water. Our faces had been too sore to shave that morning, so I suppose he gathered from our appearance that we wanted the hot water for that purpose.

My brother Keith then had a try in that Australian tongue, famed alike for its potency and rhetoric, and universally understood throughout the breadth of the battlefields. That mechanic bowed most politely and profusely and returned in great haste, bearing triumphantly a second jug of hot water. My brother's growth, like his temper, is much more bristly than mine. While we both were

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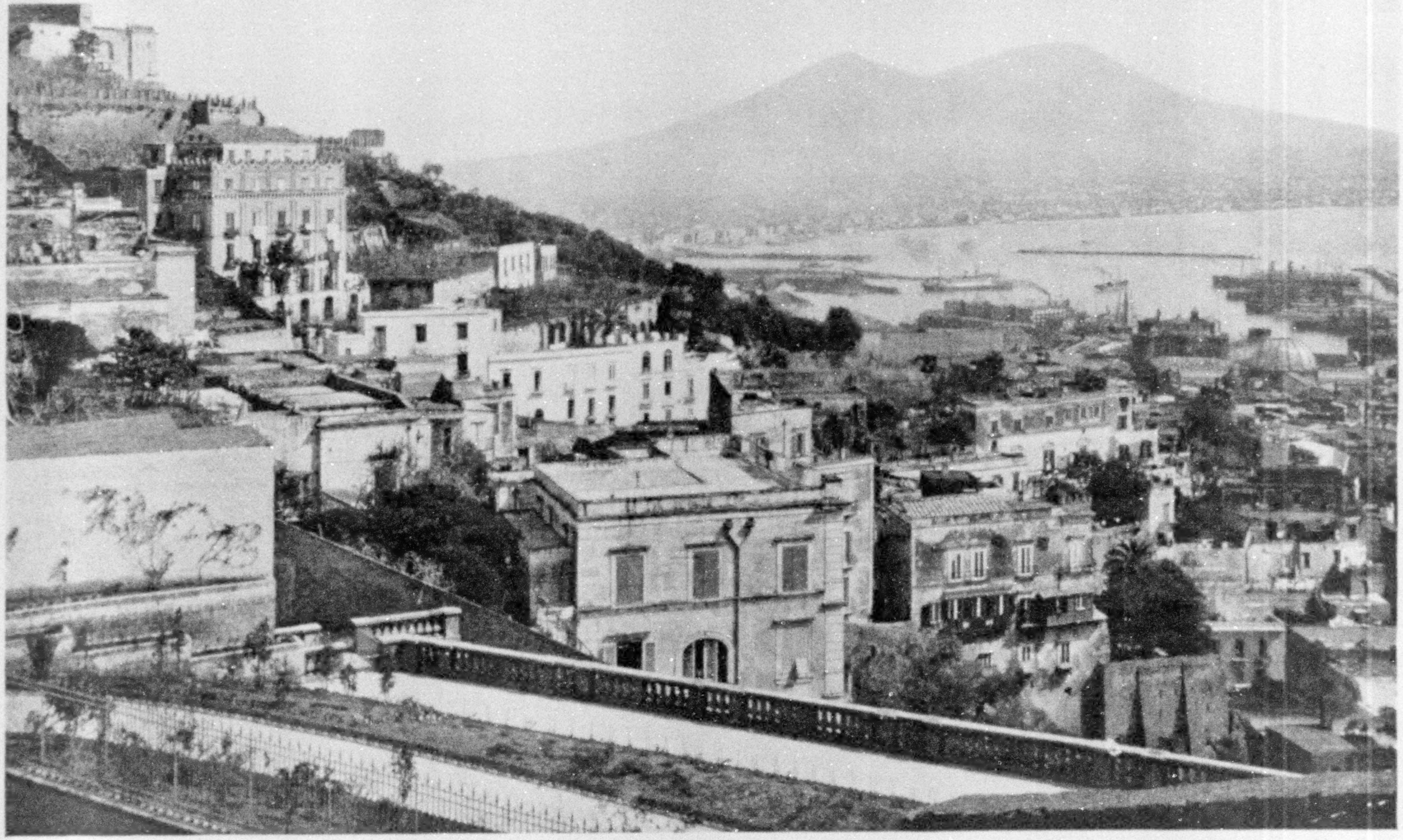


Photograph by Earle Harrison

A DETOUR WAS MADE TO NAPLES (SEE PAGE 200)

But clouds and mists robbed the aviators of the opportunity to take an air view of this superb bay and the city enthroned upon the encircling hills.

literally "losing our hair," my indispensable Bennett and Shiers had filled several petrol tins with water and had borrowed a large blow-lamp. Thus was the water heated and our tempers cooled.

II. From Lyons—Across the Mediterranean—to Cairo

We had planned overnight to leave Lyons immediately after an early breakfast, and we hoped to land at Rome well before the day closed. The delay in securing warm water for our radiators, however, meant that we were not in the air till 10 o'clock.

It was a frosty daybreak, and for a short time we encountered some clouds; but as we progressed these drifted away, clearing the atmosphere and unfolding a scene of bewildering beauty. Eastward the Alps reared up, serrating the horizon with a maze of glistening snow-peaks. Seas of cloud filled the valleys, with innumerable dark, rocky pinnacles piercing through and giving the whole scene the appearance of a rock-torn surf. Charming villas, set amidst lawns and gardens, lay tucked away over the hillsides. White roadways streaked the landscape, and close by the coast ran the thin lines of steel along which a toylike train was passing with its burden of sightseers to Monte Carlo and the playground of Europe.

ACROSS THE RIVIERA

The air was keen-edged and the cold was still severe, but after the icy blasts and the spear-pointed showers of the previous day, the going was excellent. We were freed, too, from the anxiety of shaping our course by sheer navigation. Nature's great map was no longer obscured. It lay unrolled below, an enlarged edition of our own tiny charts, on which we checked its features. Picking up the River Durance quite easily, we crossed it and passed above the city of Aix; then swung east, heading for the coast and Cannes—across the famous Riviera.

Soon we caught sight of the sea. Five thousand feet below us the Mediterranean was laving the cliffs of innumerable little bays and inlets, embroidering a thin white edging of surf round their rugged bases—a narrow, white boundary-line separating green-topped cliffs from deep-blue waters.

Nice soon lay below us. The city, with its fine buildings and avenues of palms, encircled by high hills, rests on the shores of a sea of wondrous blue. It is a place of ineffable charm and peace.

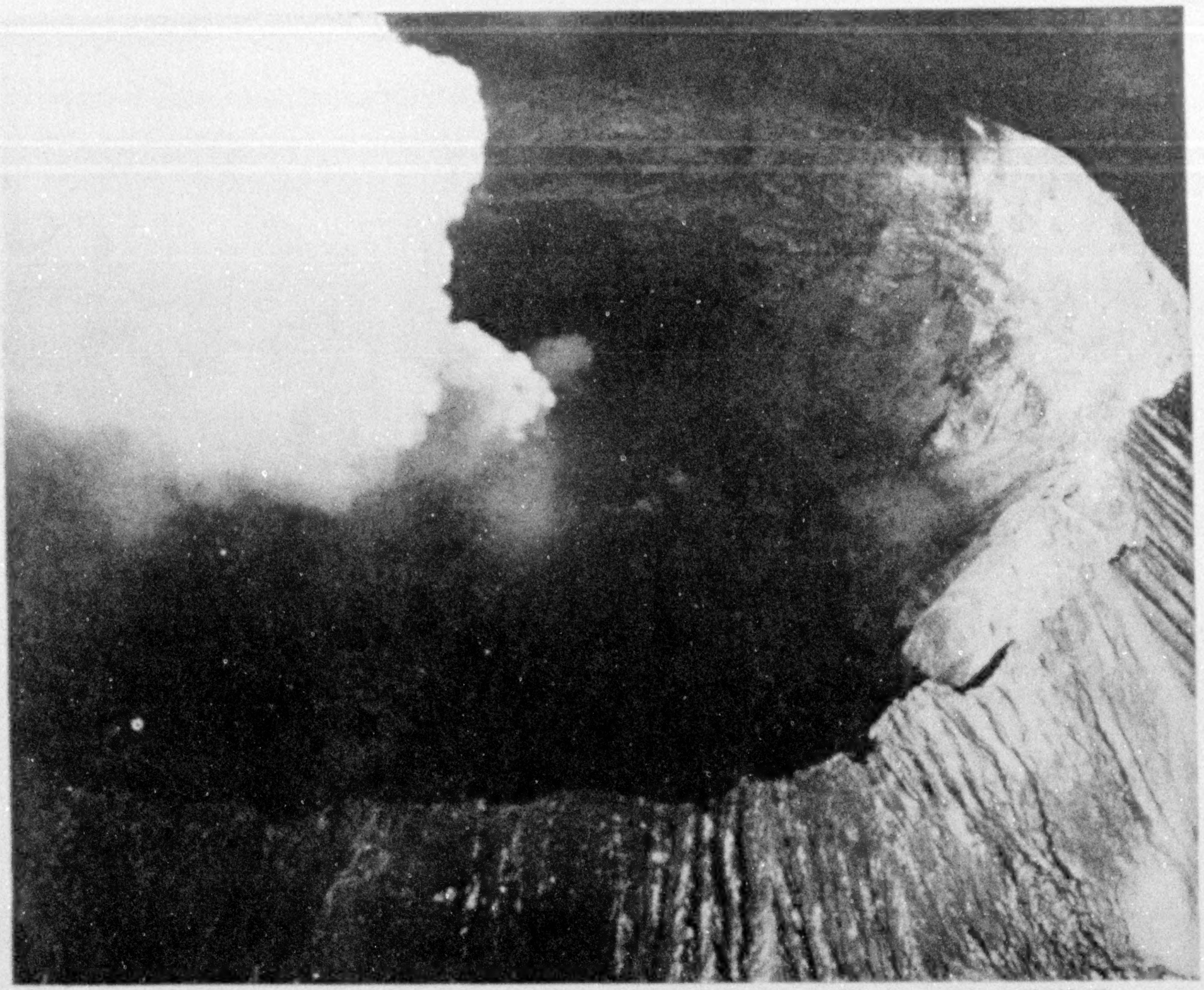
A large crowd had collected on the Promenade des Anglais to witness our flight and cheer us up. We flew low enough to distinguish the doll-like figures, and though we could not return their greetings we appreciated them none the less. Then onward again with a following breeze, white-cresting the blue sea that stretched away from beneath us to the southern horizon. We circled above Monte Carlo and the famous Casino, admiring the wonderful terraces and gardens, which looked like a skillfully carved and colored model rather than a real palace and its gardens.

We swept round, looking for a landing-place, for I was inclined to test Dame Fortune and see if she would be as kind to us at the tables as she had been to us in the air. There seemed to be no suitable spot on which to land, however, so we headed on to our course again, and soon our regrets faded in admiration of the glorious coast-line over which we were speeding. Suddenly I remembered it was the 13th; Fortune had been kind to us after all.

FAREWELL TO FRANCE AT MENTONE; ITALY'S BORDER CROSSED

Mentone, nestling in its bay, was the last glimpse we had of France; then, still following the railway line that runs along the coast, we crossed the border into Italy without trouble from the customs officials. Less than half an hour later we passed San Remo, and, instead of following the coast-line north, I kept the Vimy headed almost due east, and, crossing the Gulf of Genoa, picked up the coast again at Spezia and turned south once more. Here we met a strong head wind, and this, added to the handicap of our delayed start, made it evident that we could not reach Rome before dark.

I knew that there was an aërodrome at Pisa, since it was one of the stations on



Photograph from H. N. Hampton

A UNIQUE PHOTOGRAPH OF MOUNT VESUVIUS

This picture was made from a plane flying 500 feet over the crater of the famous volcano. Clouds of smoke are seen issuing from the abyss. The difficulties of obtaining a photograph of this kind are great, owing to the very bumpy condition of the atmosphere to which the volcano gives rise.

the air route to Egypt, so decided to spend the night there and go on to Rome early next day. It was well down the afternoon when we picked out the aërodrome, and the ground looked very wet and desolate as we circled above it. But we landed successfully through a whirl of mud and water, whisked up by the propellers.

A CORDIAL WELCOME AT PISA

As we taxied across the slippery 'drome toward the hangars, several Italian flying officers came out to greet us. They were profusely polite, and while our scholarship boasted "little French and less Italian," there was no doubt about their cordial welcome and their curiosity. By means of that universal language of gesture, in which these Latins are so accomplished, they made us at home and indicated that an English officer was stationed in Pisa and that we might reach him by telephone.

After considerable trouble I managed to have him called up and asked him to come down to the aërodrome. I was delighted to find that the officer was Captain Horne, of the Royal Air Force, who had been appointed to the air-route station. Accommodation for our party was promptly arranged, and after attending to the machine we motored into Pisa and stayed the night at an hotel.

Heavy rain set in, and when we were awakened in the morning it was still pouring, with a strong slant from the south. In spite of the unsuitable conditions, we decided to go down to the aërodrome and, if possible, get up and on to Rome that day.

On our arrival at the hangars we

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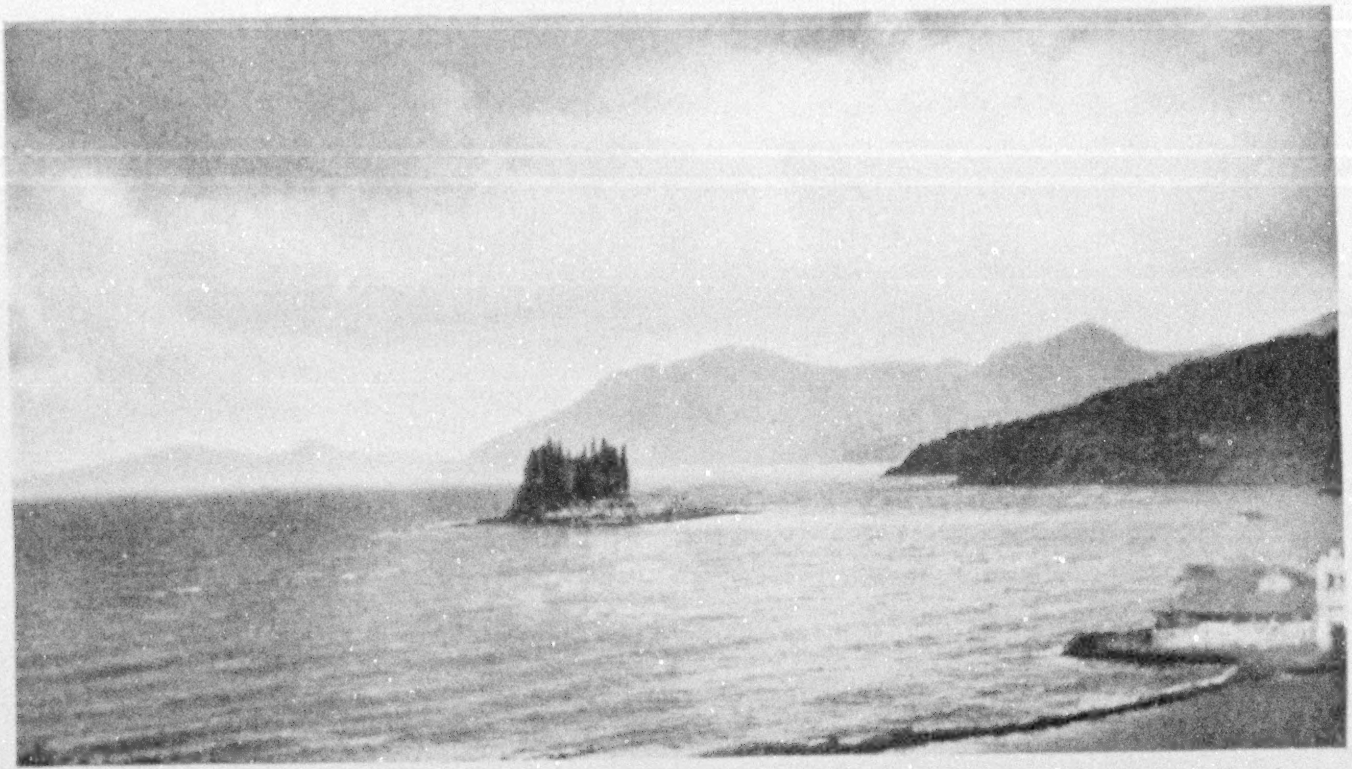


Photograph by S. P. Stambach

THE "SHIP OF ULYSSES," ISLAND OF CORFU, GREECE

Pontikonisi ("Mouse Island"), which lies at the entrance to the harbor of Corfu, according to tradition, was the Phæacian ship which brought Ulysses to Ithaca, and was afterward turned into stone by the infuriated Poseidon. "First we flew east to the heel of Italy, and then headed across the open sea to the Island of Corfu. . . . Almost before we realized it, Corfu loomed up in the mist" (see text, page 265).

found, to our dismay, that the aërodrome looked more like a lake than a landing ground. However, I started up the engines and endeavored to taxi into the wind, but the machine became badly bogged, the wheels refusing to budge an inch.

A force of thirty Italian mechanics came to help us, but it took us an hour and a half to extricate the machine. Our difficulties in getting anything like "teamwork" were increased by our lack of knowledge of Italian, and Sergeant Bennett amused us greatly by breaking into Arabic, with all the French he knew sifted in. A second attempt also resulted in failure, and by the time the machine had been dug out I came to the conclusion that it was hopeless to try to leave that day. It was still raining, so we covered up the engines and reluctantly returned to the town, soaking wet and grimed with mud.

SEEING PISA

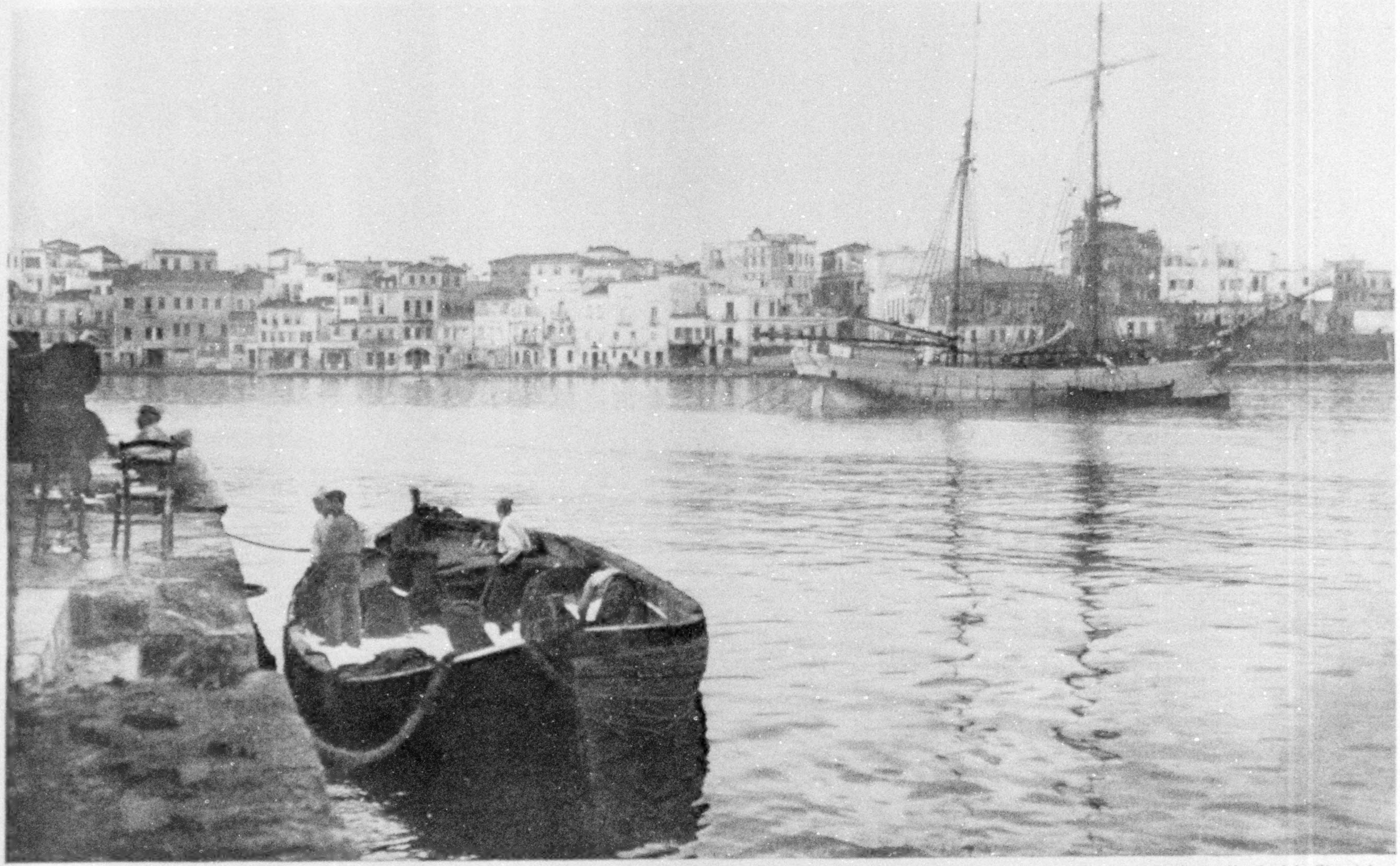
Late in the afternoon the rain ceased, so my brother and I went sight-seeing. We visited the usual hackneyed tourist sites, including the famous Leaning Tower. Elections were in progress and the whole town was swayed with excitement. We attracted much attention walking about in uniform; for, besides Captain Horne, we were the only British officers in Pisa.

BENNETT'S FLYING LEAP

We were cheerful, for we had hopes that the water would drain off the aërodrome by the following morning, but once more we awoke to disappointment. Drizzling rain and a cold south wind ushered in the new day. However, we went down to the aërodrome, determined to get the machine into the air somehow.

My brother and I walked over the aërodrome, stamping in the mud to try to find a hard track for the machine. We got very wet, but managed to find a pathway with a fairly hard surface.

All went well until I swung the machine round, just preparatory to opening the engines full out for getting off. In doing this sharp turn, one wheel became a pivot in the mud and stuck fast; so once more we were badly bogged. Our



Photograph from Frederick Simpich

THE HARBOR OF CANEA, CRETE, WHERE THE VIMY PAUSED IN ITS FLIGHT ACROSS THE MEDITERRANEAN

"We found Canea to be an extremely picturesque and interesting old place, with its massive castle walls, narrow, cobbled streets, and its quaint, old-fashioned buildings, reminiscent of a bygone age." From this point to Sallum, on the African coast, is 250 miles as the plane flies.

© Donald McLeish

THE SPHINX AND THE PYRAMID OF CHEOPS

"We headed direct for Cairo, across the gray brown sea of sand. . . . We were not sorry to descry those landmarks of the ages, the Pyramids, and soon we could pick out the minarets and mosques of the Egyptian capital itself. We had come through from Suda Bay (Crete), a distance of 680 miles, in a non-stop flight of seven and one-half hours, thus completing the first and worst of the four stages into which I had divided the total journey" (see text, page 269).

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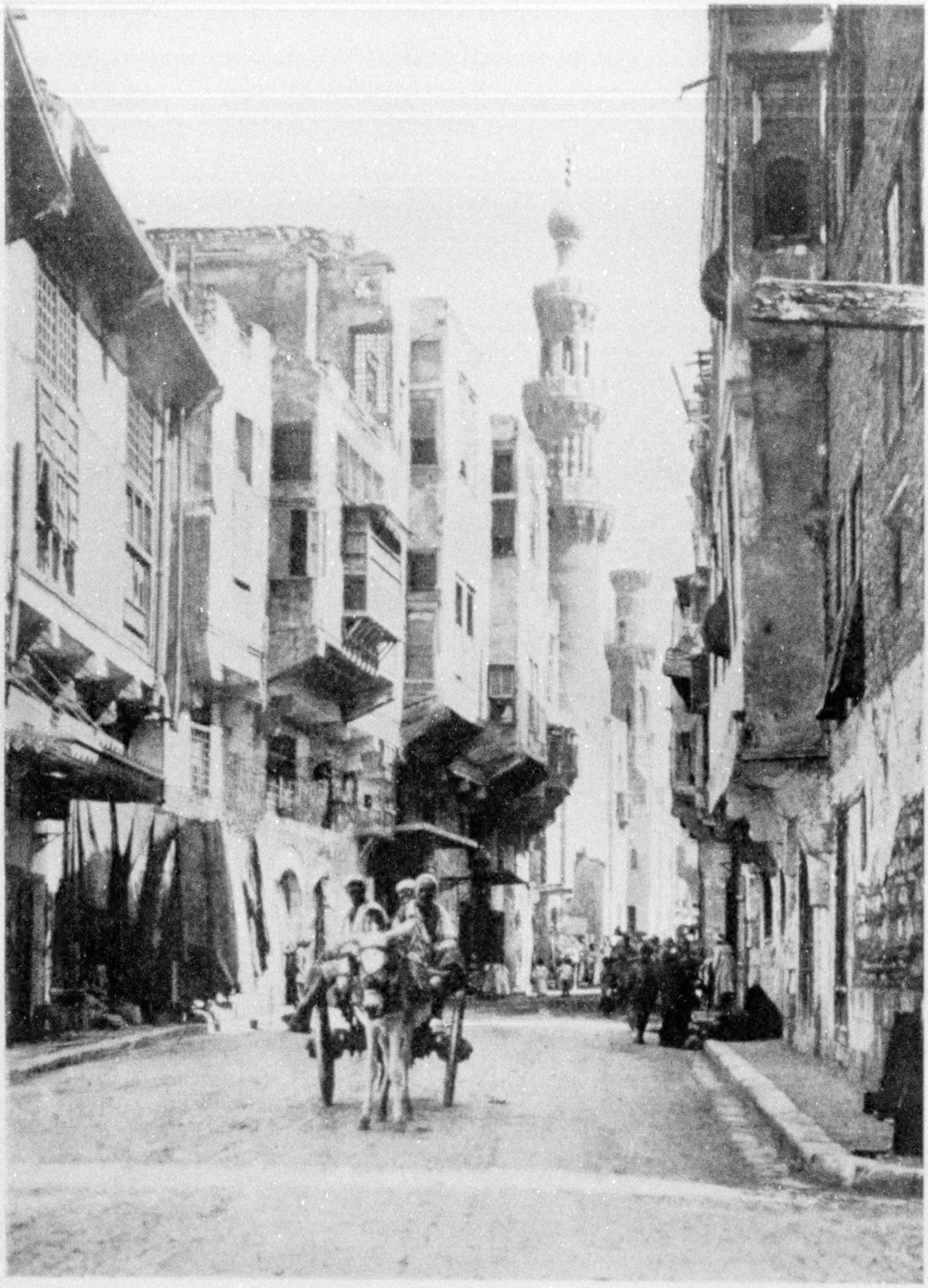

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A STREET IN CAIRO, WITH THE MOSQUES OF AGHA AND KHEIRBEK IN THE BACKGROUND

There are more than 260 mosques in Cairo, the air voyageurs' only "port of call" in Africa.

Italian friends came to the rescue again, and by digging and pulling got the machine out of the hole which it had made for itself. The ground was so soft that the wheels began to sink in slowly, and I realized that if we were to get off at all it must be at once.

I opened out the engines, but the machine would not move forward, as the wheels had become embedded in the mud; on the other hand, the tail lifted off the ground and there was the danger of the machine standing up on its nose. To overcome this difficulty, Sergeant Bennett applied the whole of his weight on to the tail-plane, and I once more opened the engines full out. Some of the Italian mechanics pulled forward on the wing-tips, and this time the machine started to move forward slowly. I suddenly realized that Bennett was not on board, but as I had got the machine moving at last, I was afraid to stop her again.

I felt sure that he would clamber on board somehow, as I had previously told him that as soon as the machine started to move he would have to make a flying jump for it or else take the next train to Rome.

We gathered way very rapidly, and, after leaving the ground, I was delighted to see Sergeant Bennett on board when I looked round. The take-off was very exciting and hazardous, as the Vimy had to plow her way through soft mud and water. The water was sucked up and whirled around by the propellers, so that we became soaked through and plastered with liquid mud. I am sure that in a cinema picture our performance would resemble the take-off of a seaplane more than that of a land machine rising from an aërodrome. We were tremendously relieved to find the freedom of our wings again, and though we laughed at our discomfiture, it was certainly a providential take-off and one that I should not care to repeat. We afterwards learned that we had been doubly lucky, for the rain continued to fall in torrents for the next week and the aërodrome was temporarily impossible.

A ROUGH PASSAGE

Our flight toward Rome was one long battle against heavy head winds and through dense clouds. We had been in the air barely an hour when the oil-gauge on one of the engines dropped to zero.

Thinking that something had gone wrong with the lubricating system, I switched off this engine and flew along close to the ground on the other engine, looking closely for a place to land. Fortunately we were not far from the Italian aërodrome at Venturina, and there I landed.

Sergeant Shiers quickly discovered that the fault was in the gauge itself, and not in the lubricating system, and it was only a matter of minutes before we were in the air again. The wind had increased, and the rest of the voyage to Rome was boisterous and unpleasant. Our average ground speed was a bare fifty miles an hour, so that it was not till late in the afternoon that we were above the city of the Cæsars.

STIRRED BY THE BEAUTY OF ROME

In spite of the fatigue induced by our strenuous experiences of the day and our eagerness to get down to earth, I could not help being stirred by the beauty of the historic city. The sun was peering through the space between the clouds and the distant mountain tops and, slanting across the city, gave it an appearance of majestic splendor. In this soft evening light, Rome reflected something of its old glory. Details were subdued, so that much of the ugliness of its modern constructions was softened. Below, "the Yellow Tiber," spanned by numerous bridges, curved a silvery course out into the twilight and to the sea.

In the brief space of a few minutes we had circled the city within the walls, and it was with feelings of relief that we landed at the Centocelle aërodrome. A hospitable welcome was accorded us by the commandant of the Italian Flying Corps and by the British air attaché. The latter kindly attended to our wants, had a military guard placed over the machine, and acted as interpreter.

My original plan was to make the next stage a non-stop flight from Rome to Athens, thence to Cairo in another flight. This decision was the result of a report received in England that the aërodrome at Suda Bay, on the northern side of

LATEEN-SAIL CRAFT ON THE RIVER NILE

Crete, was flooded and would be unfit for landing till after winter. The air attaché at Rome, however, told me that the Suda Bay 'drome was still in good condition, but that I could make sure by dropping down at Taranto and inquiring at the British aërodrome there.

A glance at the map will show that the Cretan route saves a considerable distance, Suda Bay providing a half-way house. I therefore decided at once to take the Taranto course and try to save the long stretch of Mediterranean from Athens to Cairo.

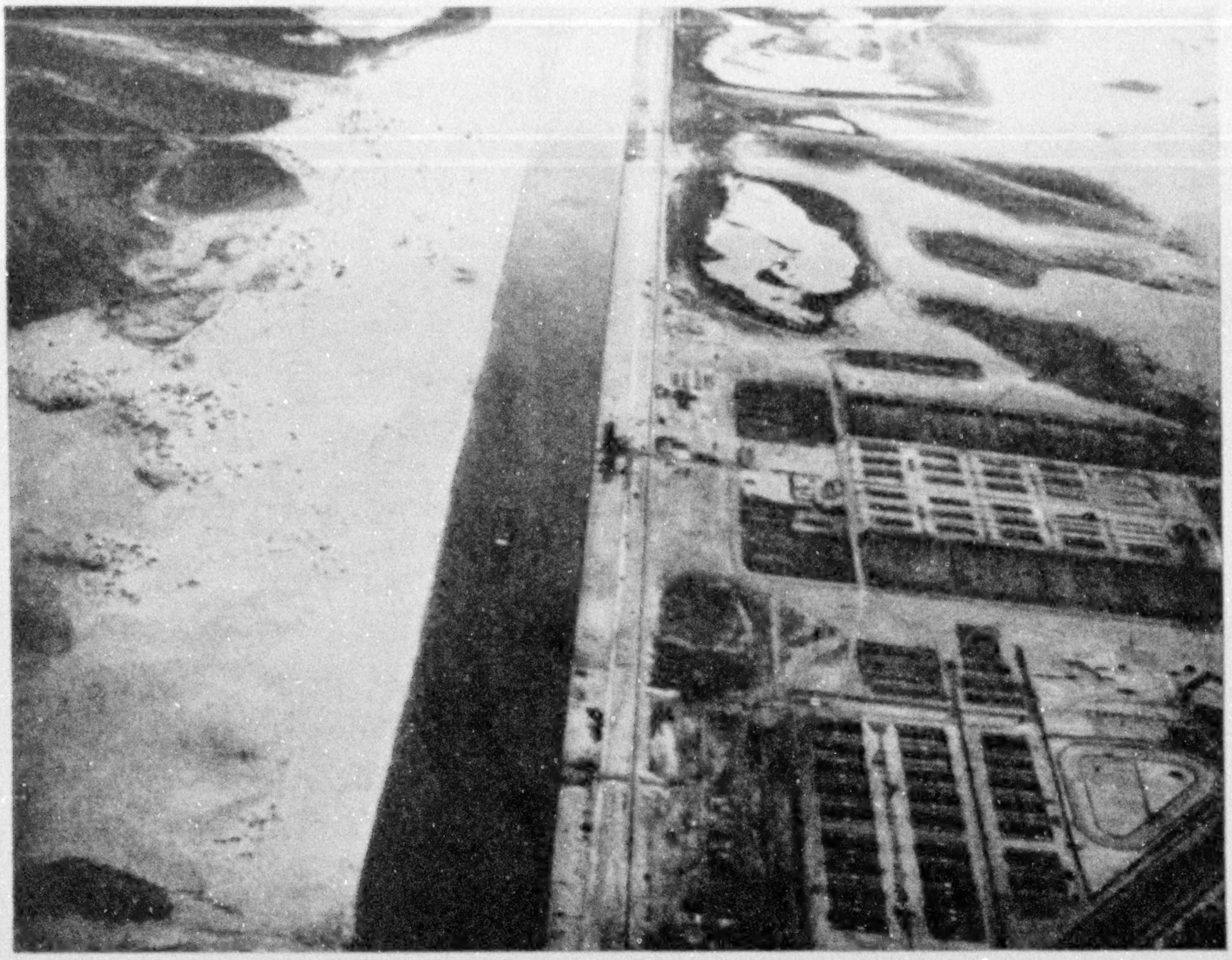
HOW WE FAILED TO "SEE NAPLES AND DIE"

After daylight, we left Rome in very bad weather. Our route for the first few miles followed the Appian Way, and as we were flying low we had a fine view of this ancient highway. The landscape for the most part was obscured by broken clouds, but through the rifts we had fleeting glimpses of the wild and spectacular nature below us.

Naples was not directly on our course to Taranto, but having visited it previously as a tourist, I made a detour in order to photograph and gaze down upon its wondrous bay from the sky. To my intense disappointment, clouds and mist robbed us of my desire, and even the mighty Vesuvius was buried somewhere beneath the sea of clouds; so, reluctantly, I turned away and resumed our course to Taranto.

Our course now lay almost due east across the Apennines; but here again the clouds had banked against the mountains, and only an occasional peak peered through them. Owing to the clouds and my scant knowledge of the country, I determined to fly low, following, more or less, the course of the valleys, which were nearly cloud-free.

From breaks in the cloud, the sun beamed down on to vales of great loveliness. Numerous small waterfalls dashed down the mountain sides, and streams like silver threads rippled away through



Photograph by Sir Ross Smith

THE SUEZ CANAL AT KANTARA AS SEEN FROM ABOVE

"Kantara now lay below us—that vast series of store-dumps, a mushroom city beneath canvas, which had sprung into being since the British occupation of Palestine" (see text, p. 277).

the valleys. The lower steps of the mountains were terraced, and wherever a flat stretch of soil presented itself small homesteads nestled, surrounded by cultivation. Sometimes we would be only a few hundred feet above the ground when crossing the crest of a ridge; then we would burst out over a valley several thousand feet deep.

Flying became extremely difficult at this stage, owing to the bumpy nature of the atmosphere. At times the machine was literally tossed about like a leaf, and for three-quarters of an hour we experienced some of the roughest flying conditions of the whole journey. On one occasion our altimeter did a drop of 1,000 feet, and bumps of 400 and 500 feet, both upward and downward, were frequent. I can only attribute this aërial disturbance to the rough nature of the country and the proximity of clouds to the mountain tops.

A strong following wind was blowing, and I was very much relieved when we got clear of the mountains and were following the coast down to Taranto.

THE HEEL OF ITALY

The town of Taranto presents a busy scene from the air. A great number of ships and transports were anchored off shore, and as the air had now cleared somewhat, we had a glorious view of this great Mediterranean seaport, which played such an important part in the Eastern campaign. We could still discern long lines of tents in the British camp, and everywhere there was the great activity which characterizes a military center.

The town is small and picturesquely situated at the head of a little inland bay, which forms a magnificent natural harbor. Below us the boom protecting the

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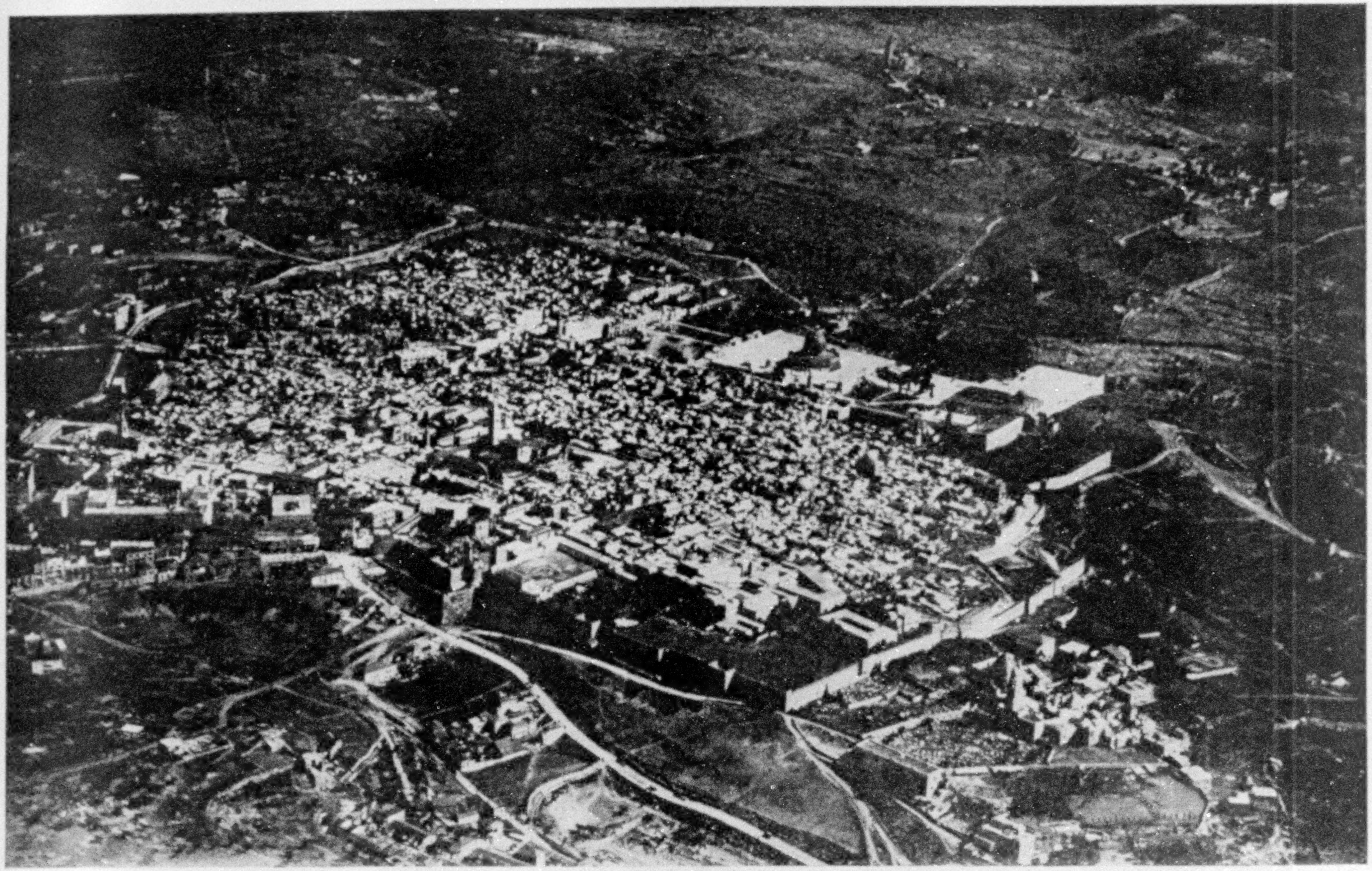

Photograph by Captain Frank Hurley

JERUSALEM FROM ON HIGH

The student of Biblical history will find many points of interest to study in this photograph, both within and outside the ancient walls. The conspicuous domed structure in the center of the vast open court is the famous Dome of the Rock. Near the upper right corner of the photograph, beyond the walls, is the Garden of Gethsemane.

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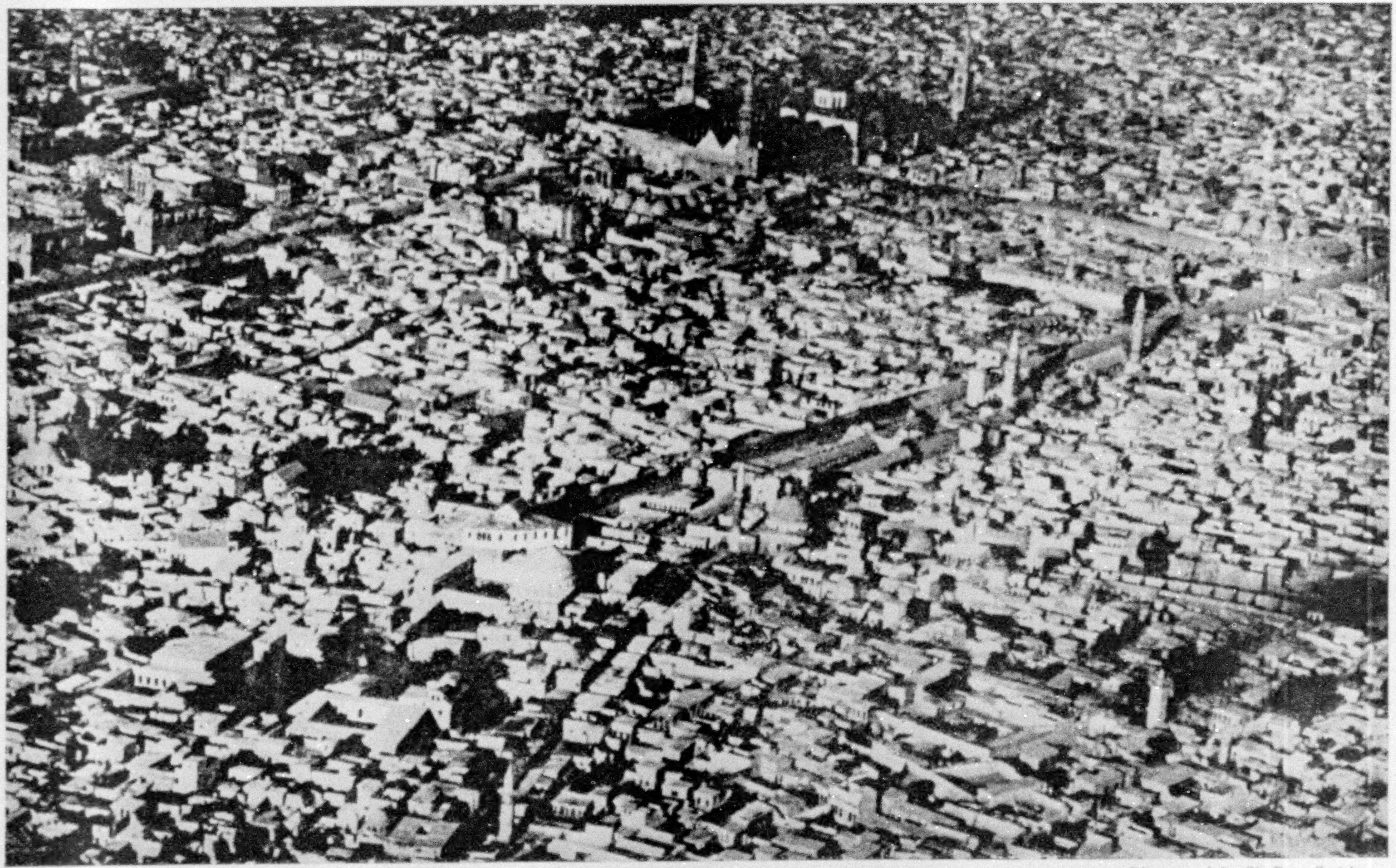
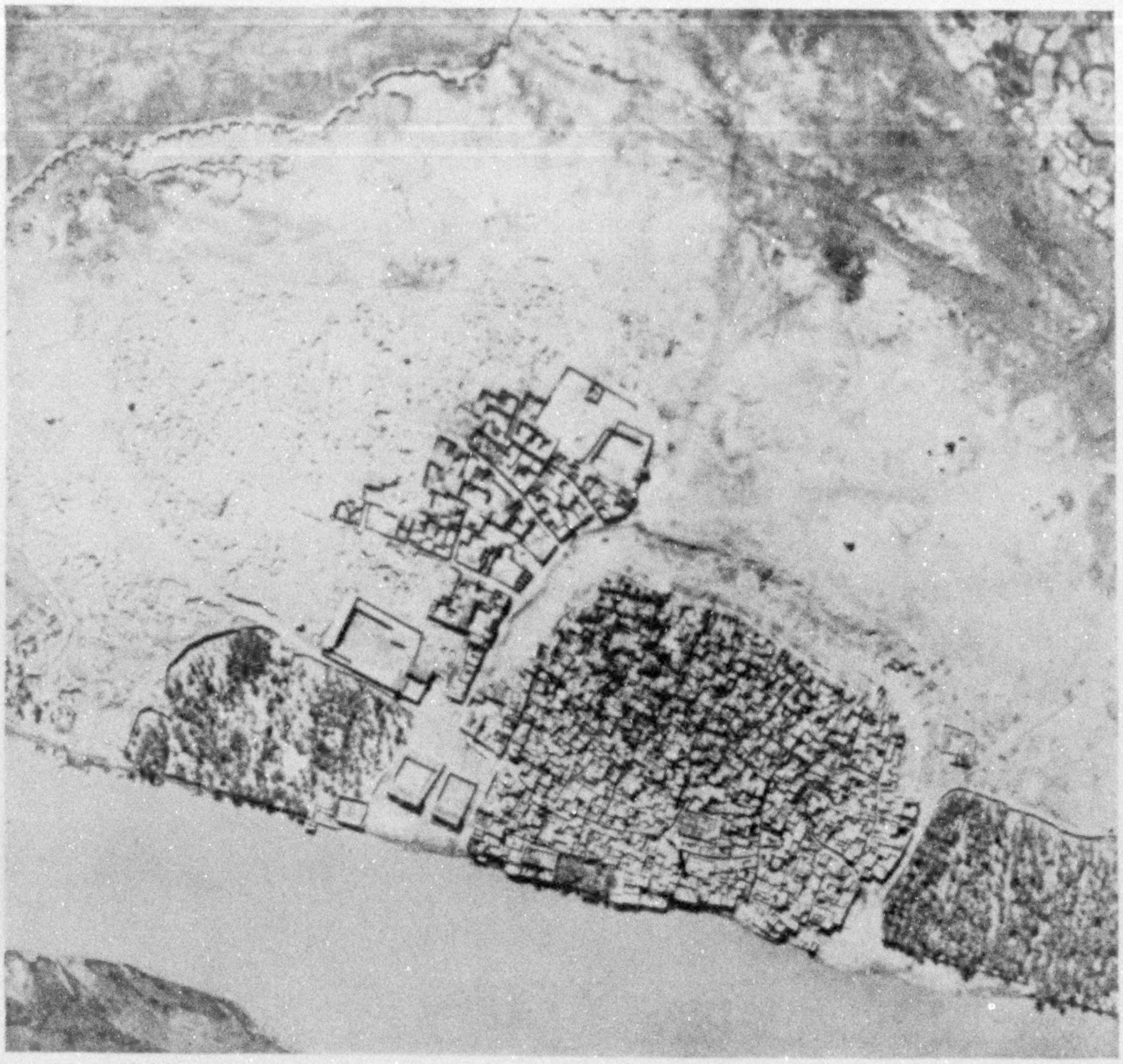


Photograph by Sir Ross Smith

AN AIRMAN'S VIEW OF ONE OF THE WORLD'S MOST HISTORIC CITIES—DAMASCUS

In their voyage from Cairo to Damascus, Sir Ross Smith and his party, in forty minutes, flew over the region in which the Children of Israel wandered for forty years. "Damascus, a miraged streak on the horizon of a desert wilderness, grew into a band, assuming height and breadth. Color crept in, detail resolved, developed, enlarged; a city arose from out the waste of sands, an oasis, glorious, magical, enchanting—this was Damascus—a city almost ethereal in its beauty, rearing a forest of splendid minarets and cupolas" (see text, page 280).



Photograph from British Air Ministry

THE VILLAGE OF HIT, AT THE HEAD OF NAVIGATION ON THE EUPHRATES

Practically every native who owns a boat on the Euphrates has followed the injunction given to Noah, to "pitch it within and without with pitch"; and much of the pitch comes from the bitumen springs of Hit.

entrance from submarines was clearly discernible.

When we landed we were greeted by a number of officers of the Royal Air Force who were stationed there, as Taranto at that time was one of the main aërodromes on the route from London to Cairo.

The machine was pegged down and lashed, and after an excellent lunch at the officers' mess we spent the afternoon working on the engines and preparing for the flight across the sea to Crete the following day. The British camp was particularly well kept, and in front of the headquarters there was a fine garden with the chrysanthemums in full bloom.

Here I met many old comrades with whom I had been associated during the war. This meeting was a pleasant relaxation from the mental strain of the past few days, and I gleaned much valuable information about the aërodrome at Suda Bay. I was delighted to learn that it was still in good condition and was in charge of Royal Air Force personnel. This information finally decided me to cancel the idea of flying on to Athens. I now determined to fly on to Suda Bay, thus cutting the long sea flight of the Mediterranean into two shorter sections and saving upward of 200 miles.

After a good night's rest in comfort-

XUM

able beds, we were up at our usual hour and made an early start for Suda Bay.

Once again the weather was cruel to us. First, we flew east to the heel of Italy, and then headed across the open sea to the island of Corfu. Low cloud and rain forced us down to 800 feet above the sea. The flight was miserable. The driving rain cut our faces and obscured all distant vision. Almost before we realized it, Corfu loomed up in the mist, and so I altered the course to southeast and flew down the coast of Greece.

The bad weather made our voyage down this rugged coast very hazardous, and on one occasion, after passing through a particularly low bank of cloud, I was terrified to observe a rocky island loom up in the mist directly ahead. It was only by turning sharply at right angles that I avoided crashing the machine against its precipitous sides.

All this time we were flying at a height of no more than 800 feet, and so it was with intense relief that we reached Cape Matea, the most southern point of Greece, and headed across the sea to Crete.

The clouds now lifted, and the mists dissipated, unfolding a scene of rare enchantment. The high ranges of Crete soon loomed up before us. A layer of cloud encircled the island like a great wreath. The mountains rose nobly above it, and the coasts, rocky and surf-beaten, could be seen below. All this, set in a sea of wondrous blue, bathed in bright sunshine, lay before us. It was a gladsome and welcome sight.

Wheeling above the town of Canea, which is on the opposite side of a narrow neck to Suda Bay, we soon located the aërodrome and circled above it preparatory to landing.

THE LAND OF HISTORY AND LEGEND

The aërodrome is not of the best and is rather a tricky place for negotiating a landing, being surrounded on three sides by high, rocky hills; but we succeeded in making a good landing. Here, too, we were welcomed by an officer of the Royal Air Force and a small crowd of inhabitants, who gathered round the machine, examining it—and us—with curious interest.

With the knowledge that on the morrow our longest oversea flight, in this half of the voyage, awaited us, we spent most of the afternoon in a particularly thorough overhaul of the machine, and then accepted our R. A. F. friend's invitation to look over the town and take tea at his house. We found Canea to be an extremely picturesque and interesting old place. Its massive castle walls, its narrow, cobbled streets, and its quaint, old-fashioned, but substantial, buildings, reminiscent of a bygone age, are all in keeping with its history, which runs back of the Christian era, and its legends, which run back a league or two further.

Our pilot excited our admiration by the expert way in which he steered us through a maze of rough-surfaced alleyways, our Ford causing a great scattering of children and dogs—both of which appear to thrive here in large numbers.

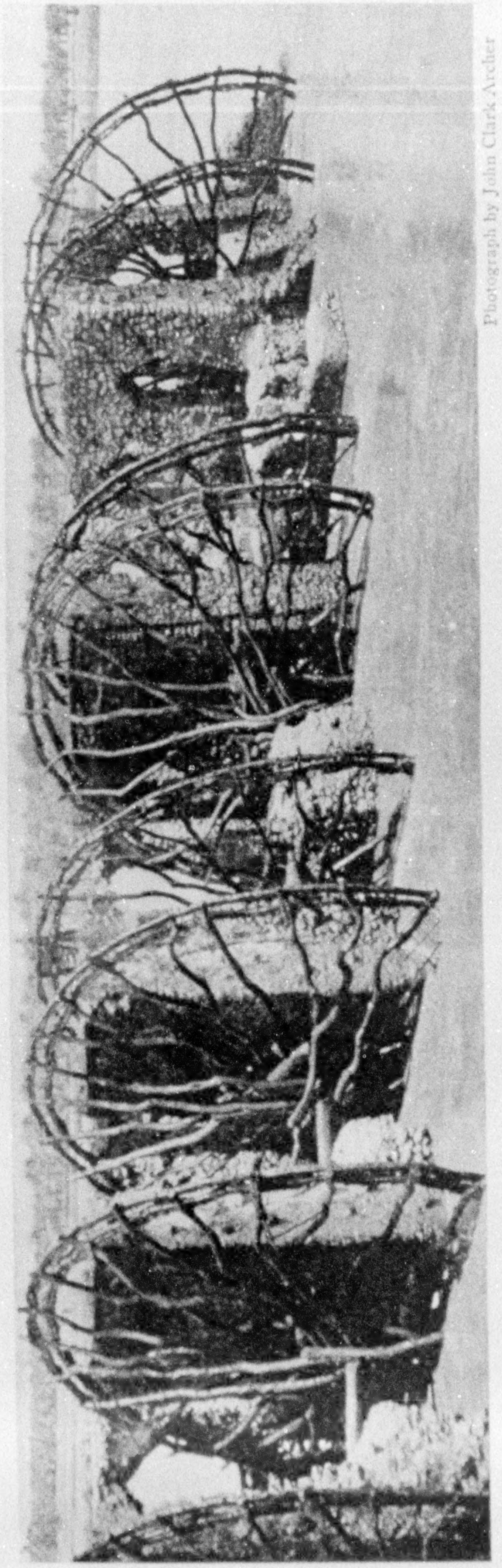
AN ATTACK OF "PRICKLY HEAT"

Eventually he conducted us to a quaint little café—a sort of tavern, at which the people seem by custom to foregather for a cup of coffee before dinner. The café-au-lait was excellent, and, as our host racily recounted his experiences, I came to the conclusion that life in Canea, small and isolated as it is, holds compensations, and is not nearly as dull as it appears at first glance.

The short run home to our R. A. F. friend's house was certainly not monotonous, but we arrived undamaged and undamaging. Since the house was rather small to accommodate unexpected guests, we cheerfully agreed to sleep in the small British hospital close by. We turned in early, planning to take a good night's rest and get away betimes in the morning.

A few minutes after putting out the lights, I heard my brother Keith tossing about in bed, and called out to know if anything ailed him. "Yes," he said, "I fancy I'm getting prickly heat." A few minutes later I got a touch of it myself, and, bounding out of bed, reached for the candle. The beds were full of prickly heat! "Prickly heat" held the fort in large and hungry battalions.

We retreated and spent the night curled up on the floor of an adjoining room. When we turned out we found that it had



Photograph by John Clark Archer

WATER-WHEELS OF THE EUPHRATES AT HIT (SEE PAGE 289)

These irrigation devices, 30 feet in diameter, are operated by the river current. They are equipped with crude cups, which spill their contents of river water into a sluiceway as they make the turnover.

been raining heavily and the air was still thick with drizzle. The prospect was not good for crossing the island, which, though only a few miles wide, is intersected by an irregular range of mountains, of which the famous Mount Ida is one of several peaks. But, with our experience of the muddy aërodrome at Pisa fresh in our minds, we decided to get aloft as soon as possible rather than risk the ground which was already becoming soft, degenerating into a bog.

THROUGH THE MOUNTAIN PASS

We took off quite easily, and soon after leaving the ground encountered a layer of cloud, but pushed through and out—only to find ourselves beneath another stratum. Our charted route lay southeast, then south, with the southernmost point of the island as the objective, and I had been told that it was easy to follow a rough track leading from Canea through a pass in the mountains; but, with clouds above and below, it was not so easy.

I decided to try to locate the pass in the hope of getting through without the necessity of climbing above the mountains, and so wasting valuable time. Fortune favored us. I found the pass and to my joy discovered that there was just sufficient room for us to scrape over the top without entering the cloud. We appeared to be only a few feet above the rocks when we cleared the crest, but it was preferable to having to barge blindly through the clouds, running the consequent risk of hitting a mountain crag.

On the southern side of the ranges the air was much clearer, and we were soon flying over the coast-line. We took observations and set a compass course for Sallum, on the African coast. Two hundred and fifty miles of open sea had to be crossed. Be-

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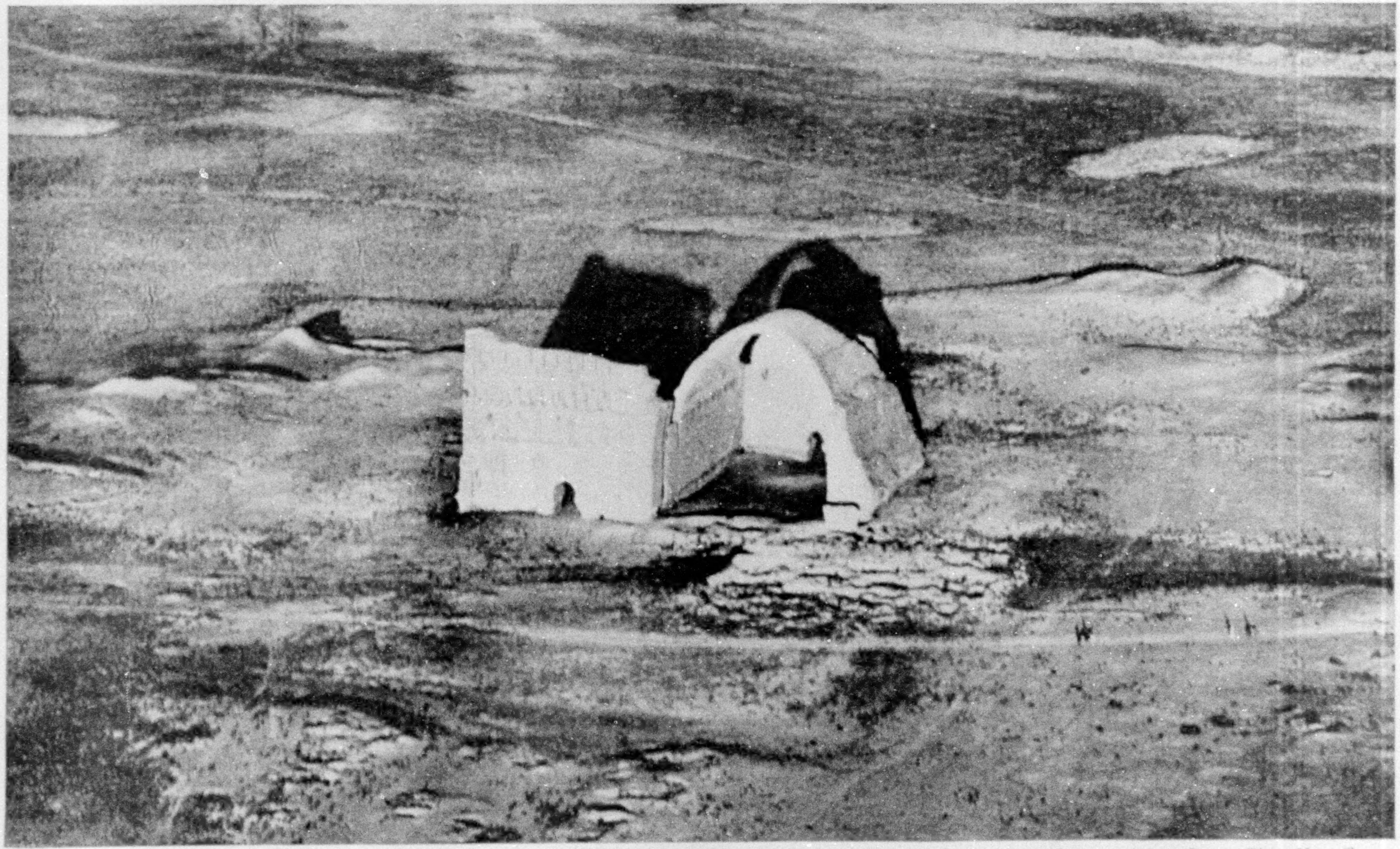
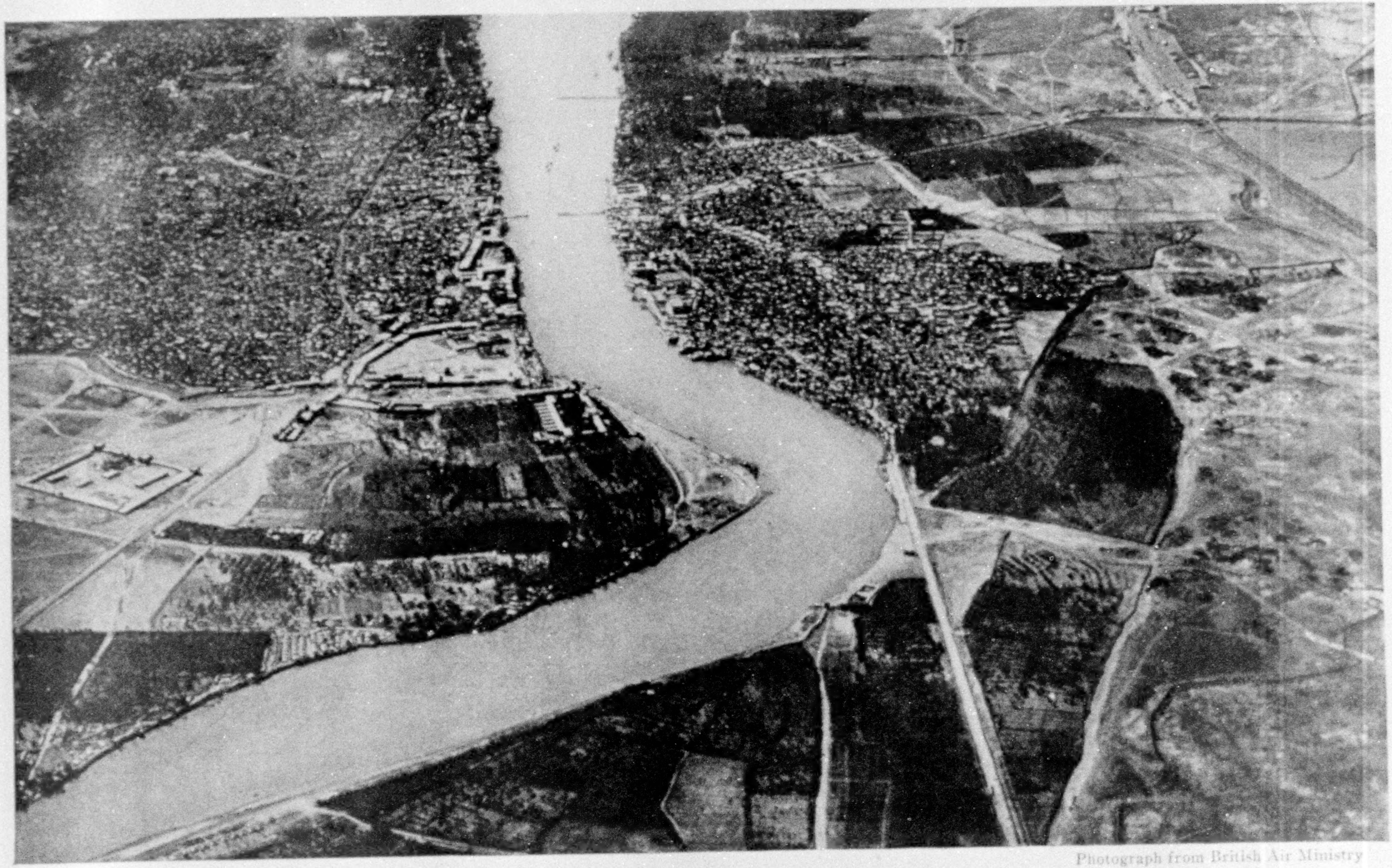


Photograph from Boston Photo News Co.

THE RUINS OF THE ANCIENT CITY OF CTESIPHON, NEAR BAGDAD (SEE PAGE 291)

In the center of the picture is the august throne hall, the most splendid example of Sassanian architecture in existence. Through the high arched entrance may be seen the throne on which mighty kings once sat. Nestling at the base of the towering ruin is a native village. This photograph was taken from an elevation of 2,000 feet.



Photograph from British Air Ministry

BAGDAD, THE MAGIC CITY OF HAROUN-AL-RASCHID, OF ALADDIN, AND OF SINDBAD THE SAILOR

It is today a city of squalor and decay, but its name still conjures in the imagination pictures of oriental opulence, romance, and intrigue (see text, page 291).

fore we started, Bennett and Shiers had given a final look over the engines, which had been running perfectly, and almost the last thing they did before climbing aboard was to inflate the four spare inner tubes of our landing wheels; they would make first-class life-buoys if we had to come down between Crete and Africa.

I would have preferred flying at about 5,000 feet, but our enemies, the clouds, which ever harassed us, forced us to fly at an altitude of from 1,500 to 2,000 feet above the face of the sea. There was a light, favoring wind, and the going was smooth and even; but as the land dropped behind, and mile after mile was flown, one began to realize the meaning of the term, "a waste of waters."

On and on we flew, yet, save for the wind of our own passage through the air, could scarcely tell that we were moving; for, unlike the flight across the land and down the seacoast, there was nothing by which to gauge our movement. The cloud roof was dull and uninteresting; the sea-floor gray, desolate, and empty as far as the eye could reach.

SHIPS OF THE SEA LEFT FAR BEHIND

My brother took out his case and began writing letters. I studied the charts and the compass and kept the machine on the course. Then, suddenly, a little to the right of the course, appeared a minute object that separated into two as we drew nearer, and finally resolved itself into a pair of vessels linked together with a tow-line. Very tiny they looked down there and very lonely.

We were heading for Sallum, on the African coast, 250 miles from Crete, as the 'plane flies. I wondered if these ships were making the same port, and how long it would take them to do the journey that we were counting on accomplishing in about four hours! I felt quite sorry for the poor midgets toiling along with their tow-rope, and speculated on what would happen if a big sea got up. Doubtless they looked up at us—they must have heard our engines booming—and wondered, too. Perhaps they envied us our wings; perhaps they pitied us and congratulated themselves on the sound decks beneath their feet.

Ten minutes and they were far behind us; another ten and they were out of sight; but they had, without knowing it, cheered us immensely. They proved the only speck of life we saw on all that area of waters. Once more we entered the loneliness of sea and sky, but we had the sense of having passed a definite point, and now we kept a keen lookout for land.

ON AFRICAN SHORES

Our first glimpse of Africa was of a barren, desert coast-line, but it was a welcome sight none the less. On reaching Sallum we turned and flew along the coast as far as Mersa Matruh. The land below was flat and uninteresting desert, with nothing to relieve the monotony. Without landing at Mersa Matruh, we headed direct for Cairo, across the gray-brown sea of sand, passing over Wadi Natrum, which is merely a cluster of straggling palms beside a salt-pan.

We were not sorry to descry those landmarks of the ages, the Pyramids, and soon we could pick out the minarets and mosques of the Egyptian capital itself. Now we were winging our way over Old Father Nile and across landmarks that were as familiar to me as the Heliopolis aërodrome itself, to which destination I was guiding the Vimy.

No wonder I glanced affectionately over the silent engines as we came to rest. I felt extremely happy as we sat there a moment or two, waiting for the fellows to come up and welcome us. We had come through from Suda Bay, a distance of 680 miles, in a non-stop flight of seven and a half hours, thus completing the first and worst of the four stages into which I had divided the total journey.

THE LAST STAGE

That bit of route from London to Cairo—pioneered in 1917 by my old commanding officer, General Borton—had taken its toll, and I had been more than a little afraid of it on account of the possibility of bad weather and my ignorance of the country and the aërodromes. And here we were, safe, with our machine as sound as when she started.

A familiar stage, with all the prospects of fine weather, lay before us. There was some excuse for a flash of thankfulness and exultation. Then the boys were

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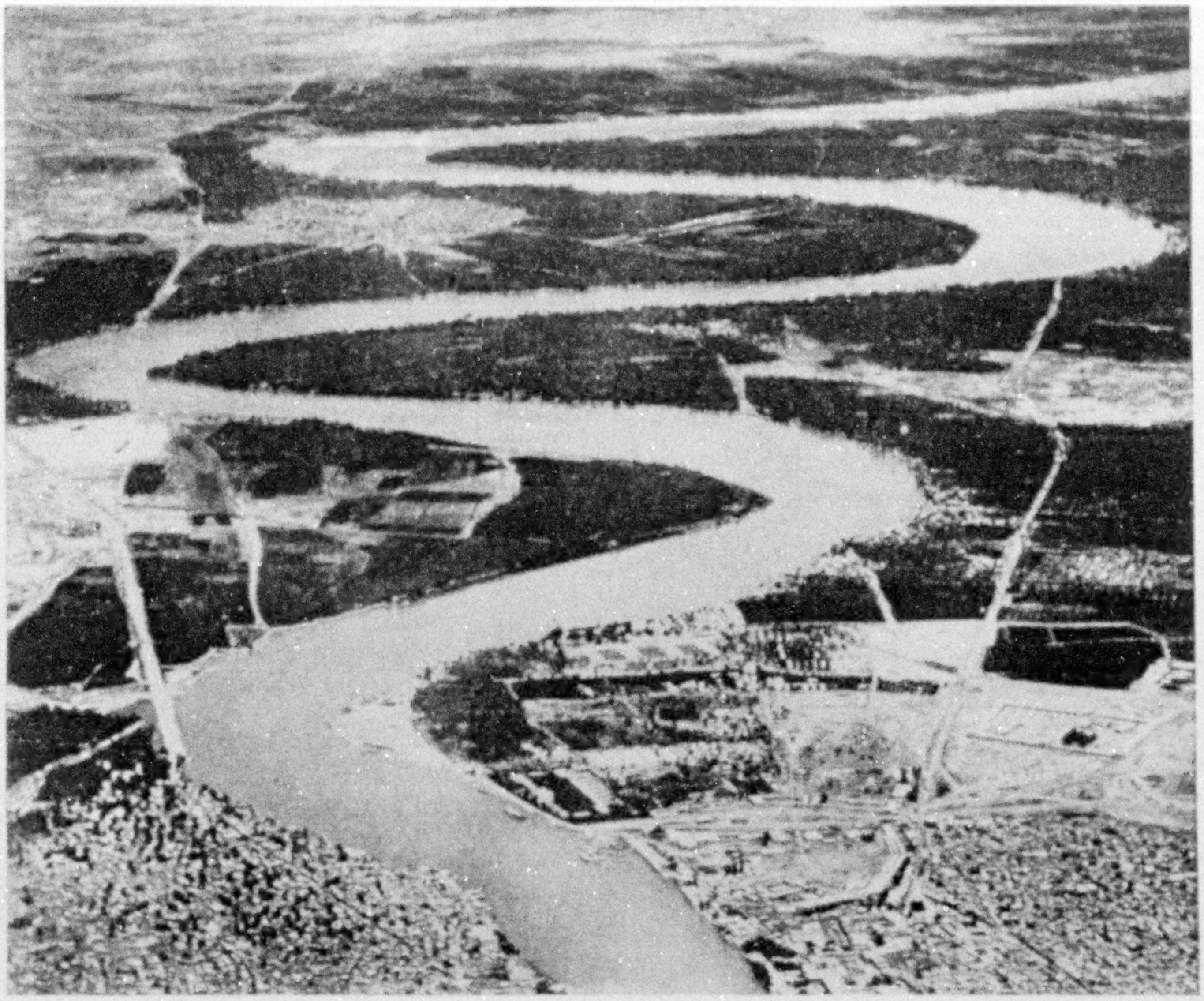


Photograph from Boston Photo News Co.

THE TIGRIS RIVER, WINDING LIKE A HUGE SNAKE, WITH THE FAMED CITY OF BAGDAD IN THE LOWER FOREGROUND

The most distant point on the River Tigris shown in the picture is 50 miles away.

greeting us, and a rousing welcome it was from men with whom I had served during the war. Our mechanics, too, found old comrades who hauled them off to celebrate the occasion before attending to the engines.

It was quite like old times to climb into a car, to spin through well-known thoroughfares to Shepheard's, to sink luxuriously into the arms of a great and familiar lounge chair, and to yarn over the events that had happened since last I occupied it.

A NIGHT IN CAIRO

My friends tried to persuade me to attend a dance that was being held there that night, but I needed all the sleep I could get, and so declined reluctantly. But for an hour or more I sat in an easy chair on the well-known veranda, listened to the sweet strains of the music inside, and that other strange blend of street cries—a veritable kaleidoscope of sound—that may be heard nowhere save in Cairo. I noted, too, the beauty and the chivalry coming in, and watched the curious procession of all sorts passing by.

I had to shake myself to be assured that it was not a splendid and fantastic dream. As we lounged there a messenger boy brought a cable for me—we had sent our own messages off long before. It was from General Borton, congratulating us on our safe arrival in Egypt and wishing us good luck for the next stage.

While I was reading this kind remembrance from my old O. C., an Arab paperboy came crying his wares, and I bought a news-sheet and read with amused interest the story of our doings during the last few days. I also read, with a shock of keen regret, of the accident that had befallen our gallant competitors, Lieuten-

Photograph by Sir Ross Smith

A SCENE NEAR BASRA

Clusters of date palms and a scant belt of vegetation fringe the banks of the Shatt-el-Arab, formed by the confluence of the Tigris and the Euphrates. "All this was once the Garden of Eden" (see text, page 293).

ants Douglas and Ross, who had both been killed practically at the starting-post, just a few days after we left, through the crashing of their machine. Then we turned to the column that recorded the progress of Monsieur Poulet, who had left Paris thirty days before and who, we saw by the cables, was now in India.

We had certainly gained a good deal on the Frenchman, but he still held a big lead, and we were keen to get on with the next stage. We turned in that night feeling happier and more rested than at any moment since we left England, and we slept like proverbial tops.

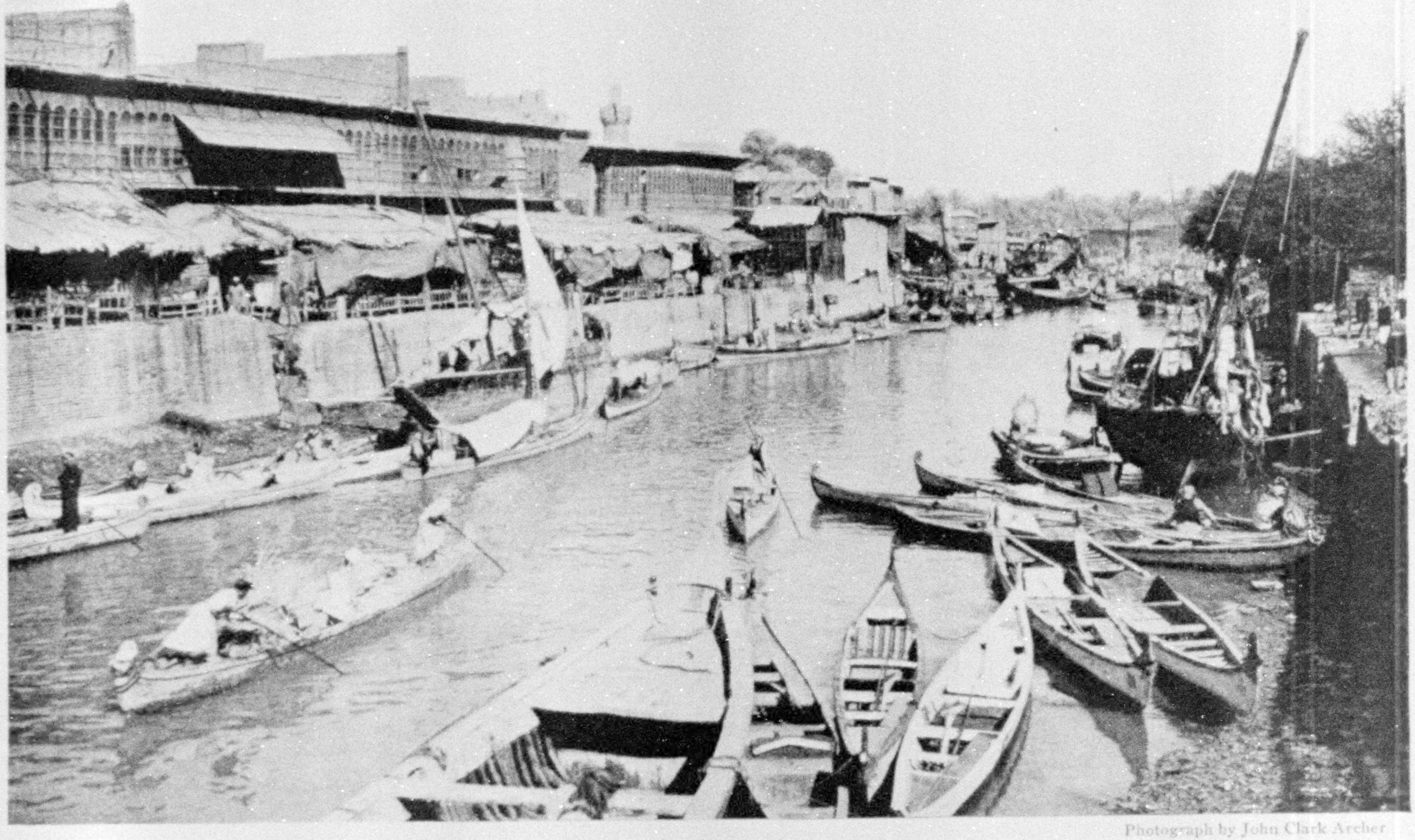
III. From Cairo Across Palestine and Mesopotamia

We had intended staying a few days in Cairo to rest, but, owing to the day we lost at Pisa, we were now one day behind our scheduled time; so I decided that it must be made up. There had been a heavy fog overnight, and on our arrival at the aërodrome the weather conditions were not at all enticing. Telegraphic reports from Palestine indicated "Weather conditions unsuited for flying."

LEAVING EGYPT

My inclinations wavered. We were at a hospitable aërodrome, surrounded by old friends; rain had begun to fall and we were all very tired. The Vimy, however, had been overhauled the night before and everything stood ready. Perhaps at the end of the journey we would be more limb-weary, and a single day might discount the success of the venture; so I made up my mind to proceed.

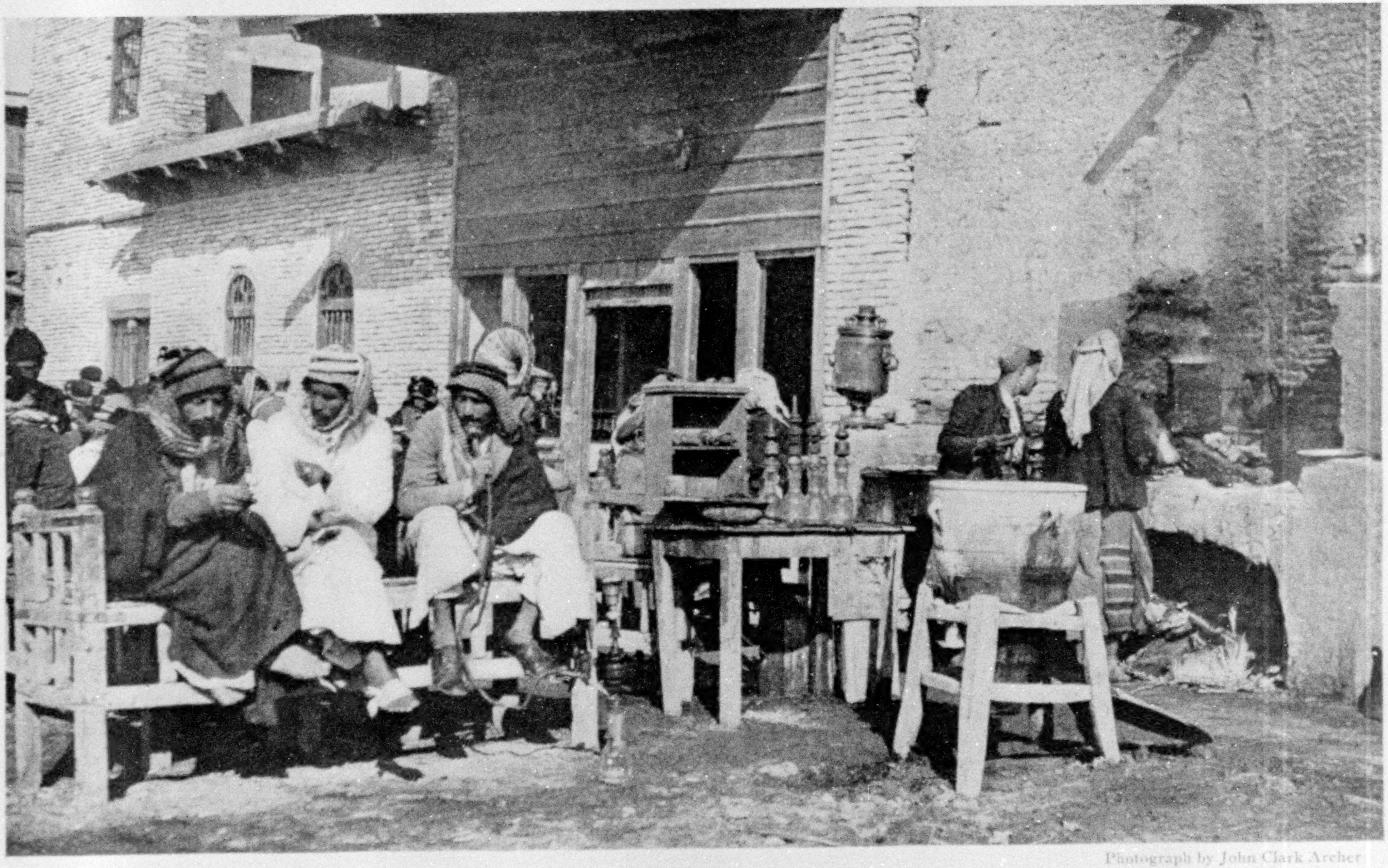
We took off from Heliopolis aërodrome with the cheers of my old war comrades sounding above our engines. For fifty miles we followed the Ismailia Canal to Tel-el-Kebir. The banks were bordered



Photograph by John Clark Archer

A GLIMPSE OF THE TEEMING LIFE ON THE CANAL EL'ASSAR AT BASRA

This important city, 70 miles from the Persian Gulf, is the port of Bagdad. The type of boat seen here is the bellem. It suggests the lines of a dugout, a canoe, and a gondola. Basra is the chief date port of the world (see text, page 293).



Photograph by John Clark Archer

AN ARAB COFFEE-HOUSE IN BASRA

The settled population of Basra is estimated at not more than 50,000, but it has a heterogeneous mixture of all the peoples of the Near East.

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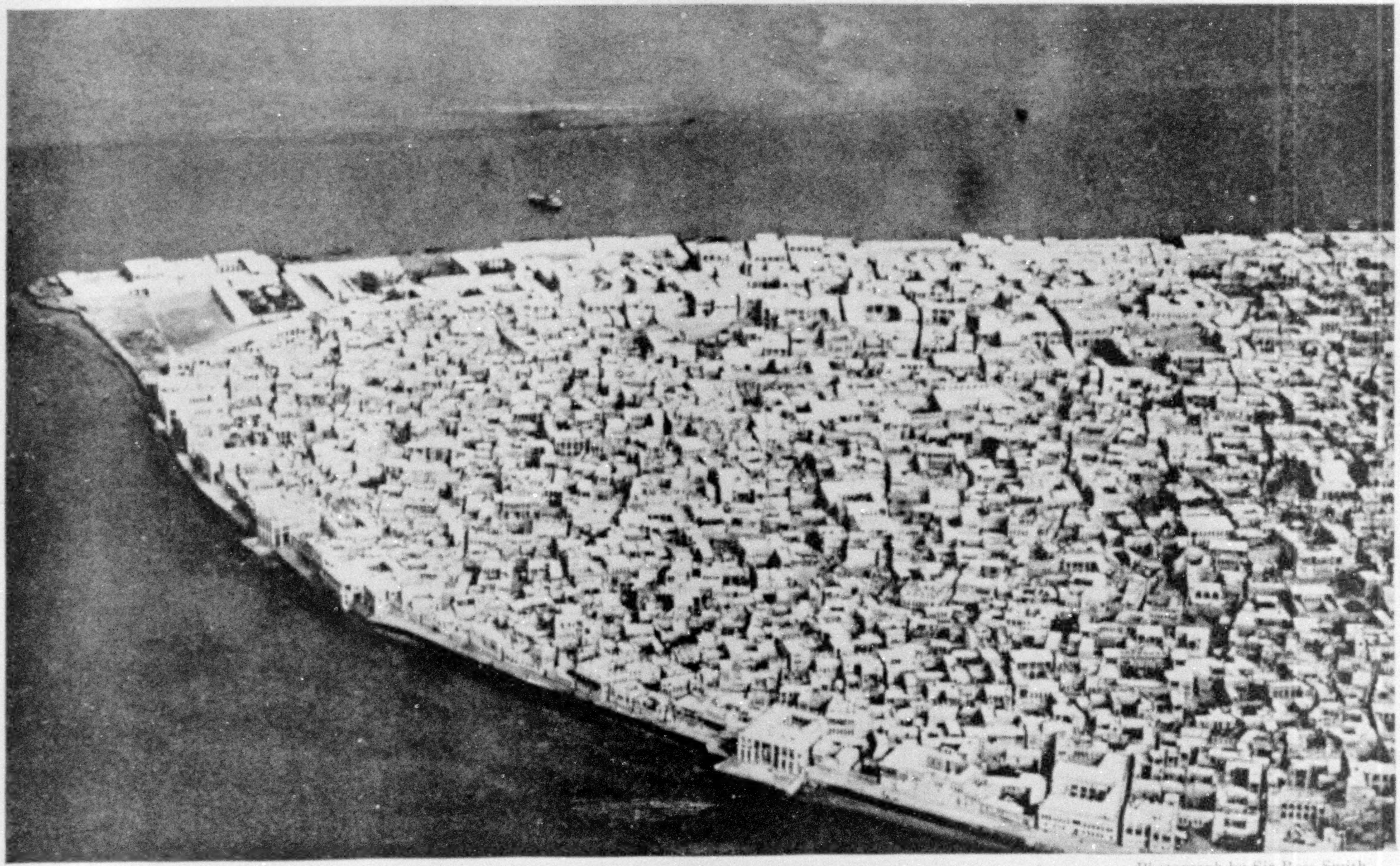

Photograph by Sir Ross Smith

"WE PASSED OVER BUSHIRE" (SEE TEXT, PAGE 293)

This is the most populous port on the Persian Gulf. It occupies the extremity of a peninsula eleven miles long and four miles wide. The white appearance of the city is due to the fact that most of the houses are built of a stone composed of shells and coral.

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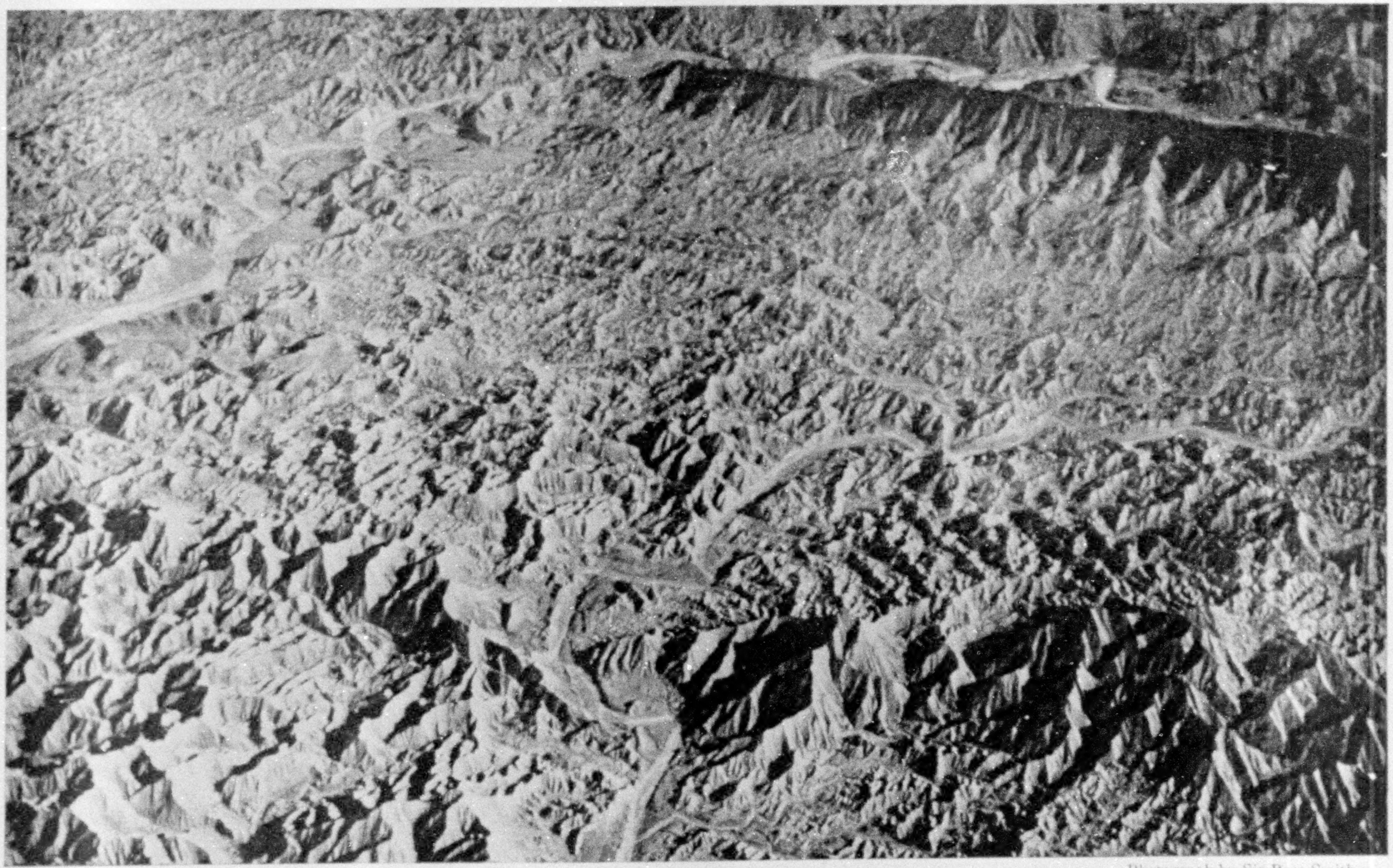


Photograph by Sir Ross Smith

LOOKING DOWN UPON THE RUGGED PERSIAN GULF COUNTRY ON THE PERSIAN SIDE

"Some of the country presents a remarkable sight, and appears as if a mighty harrow had torn down the mountain sides into abysmal furrows. Fantastically shaped ridges and razorbacks rise precipitously from deep valleys barren of vegetation and desolate of life" (see text, page 293).

Photograph by Sir Ross Smith

THE PERSIAN GOVERNOR, BRITISH CONSUL, AND A CONCOURSE OF NATIVES WELCOMED THE AVIATORS AT BANDER ABBAS, PERSIA (SEE PAGE 295)

To reach Bander Abbas from Basra necessitated a non-stop flight of 650 miles down the Persian Gulf along a route that provided no opportunity for a safe landing in the event one of the motors had failed.

by a patchwork of densely cultivated and irrigated lands; beyond, arid barrenness, sand, and nothing.

On the canal the great white lateen sails of dhows and feluccas in large number resembled a model yacht regatta. It was all very beautiful and wonderful. Northward the waterways, canals, and lakes of the Nile delta stood out like silver threads woven around the margins of patches in a patch-quilt, for the sun had now burst through the clouds, and all the world sprang into life and light. From aloft, without the sun, the world is a gloomy-looking place, doleful and dead.

Over the famous old battlefield of 1882—Tel-el-Kebir—where Arabi Pasha suffered ignominiously by the valor of British arms, even now there is a camp of British and Indian cavalry.

And soon to Ismailia and the canal that

Photograph by Sir Ross Smith

DELHI, THE FUTURE CAPITAL CITY OF INDIA, AS SEEN FROM THE VIMY (SEE P. 297)

The Ross Smith party reached Delhi thirteen days after leaving London, having flown 5,870 miles. The journey of 2,100 miles from Basra had been accomplished in 25 hours and ten minutes flying time.

links north with south—a straight cut of deep-blue water, running to the horizon transversely to our course—and ahead the gray desert sands, only limited by the blue sky.

Below, a P. and O. steamer, heading south, passes down the Suez Canal. Perhaps she is bound for Australia; she will call in at Adelaide, my home and destination! With a smile, I contrasted the old and the new methods of transportation, and a throb of exultation thrilled us all. Still, we wondered—unspoken the thoughts—who would reach Australia first.

Kantara now lay below us, that vast series of store-dumps—a mushroom city beneath canvas—which had sprung into being since the British occupation of Palestine, and from which practically all commissariat and munition supplies were drawn. As we passed over Kantara, feelings of confidence, mingled with no small satisfaction, filled me. We were now entering upon country I knew as well as my own homeland, for I had spent six months traversing it with the Australian Light Horse before I started flying; furthermore, I had been over the entire air route which now lay before us, as far as Java.

A BRIGHT PROSPECT

The section from Hounslow to Cairo I had always regarded with some trepidation, on account of the winter storms and bad weather. Now we could look forward to improving atmospheric conditions and good aërodromes as far as Calcutta at least. This enabled us to view more rosily the ultimate issue.

Kantara soon lay beyond the rolling eternity of sand which all who served through the rigors and privations of the desert campaign call "Hell." It was somewhere in these regions that the Children of Israel wandered for forty years. Forty minutes in the Vimy was quite

DANCING GIRLS OF DELHI

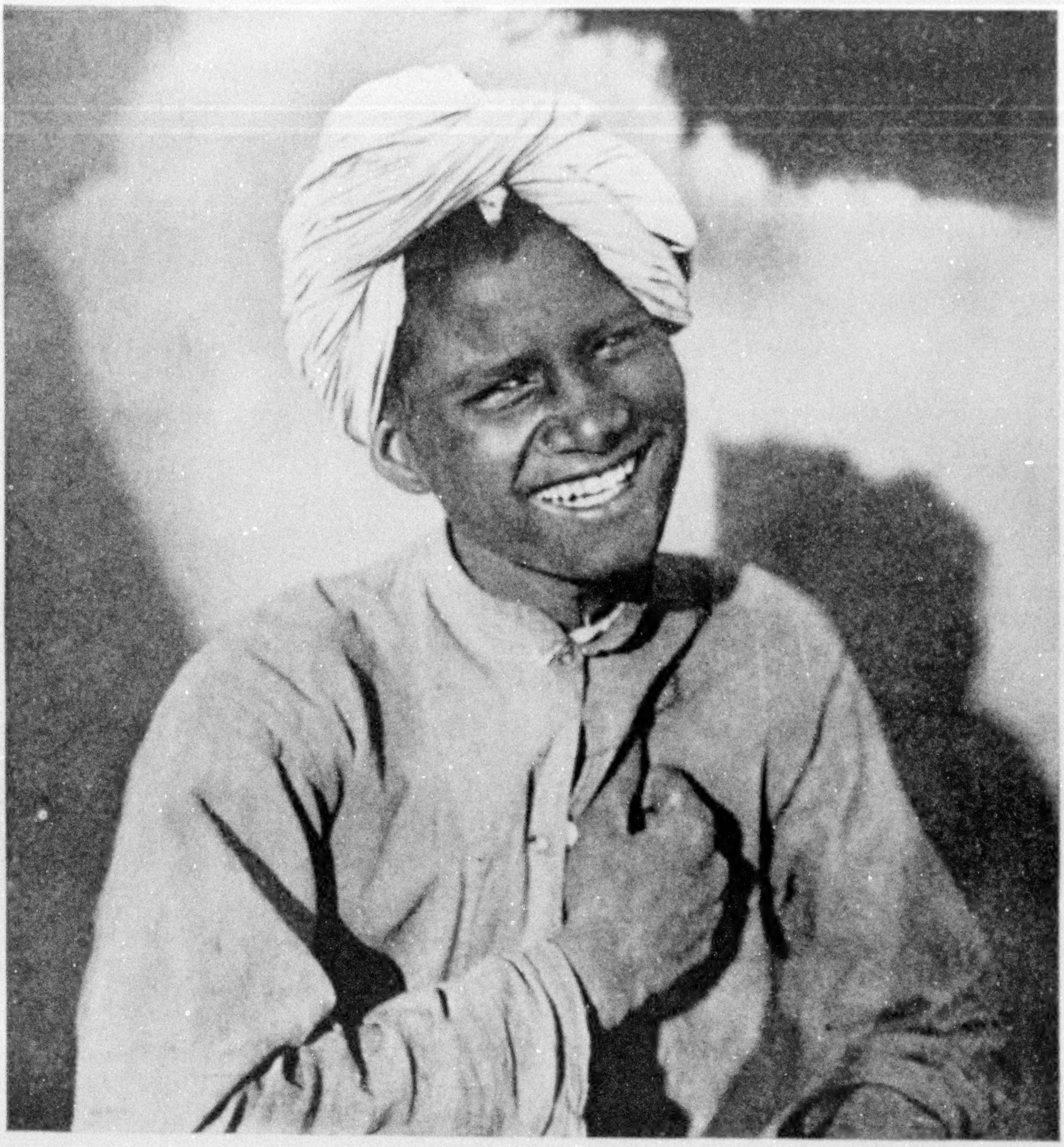
Great excitement prevailed in Delhi when the Vimy arrived, on the afternoon of the same day that Poulet, the French aviator, had departed in the race half around the world.

sufficient for us. We looked down upon that golden sea of desolation, with only here and there a solitary clump of date palms that boasts the name oasis, and we felt very sympathetic toward the Children of Israel. Two things alone stood out clearly in the wilderness—the iron way, which had been thrust forward to carry supplies from Kantara to the fighting front, and the line of water-main beside it.

We were flying at an altitude of 1,500 feet, so that it was possible to pick out all details readily. As we passed over the old battlefield of Romani, I picked out my old camping site and machine-gun nests.

THE AIR LINE ACROSS PALESTINE

El-Arish, Rafah, Gaza—all came into being; then out over the brim of the world of sand. Gaza from the air is as pitiful a sight as it is from the ground. In its loneliness and ruin, an atmosphere of great sadness has descended upon it. On the site of a once-prosperous town stands war's memorial—a necropolis of shattered buildings. The trenches before Gaza and on the hill Ali Muntar looked



A LAUGHING BOY OF DELHI

"I circled above Delhi to allow the people to see our machine" (see text, page 297).

as though they had been but recently vacated.

Next we passed over the Medjdel aërodrome, and as I gazed down at the marks where the hangars had stood, many memories of bygone days came pleasantly back to me. Soon after leaving Medjdel we ran into dense clouds, and on reaching Ramleh heavy rain began to fall. There was an R. A. F. squadron station on the old aërodrome, and I was sorely tempted to land and renew old friendships, for I had been stationed at this aërodrome for five months at the latter end of the war. However, this was no joy-ride; so I reluctantly passed over this haven of refuge, and then once more out into the bleak world of storm and rain; but I was much cheered by the whole squadron turning out on to their aërodrome and waving up to us.

THE ENGINES' SONG

My past experiences in Palestine rainstorms steeled me for what was to follow, and from Ramleh to the Sea of Galilee the weather was despicable and smote us relentlessly. The torrential rain cut our faces and well-nigh blinded us.

XUM

We were soaked through and miserably cold. One thing only comforted me, and that was the merry song of the engines. Whether "in breeze or gale or storm," they heeded not. On through the rain and wrack they bore us, as in the times of warmth and sunshine, singing their deep-throated song—"All goes well!"

Fortunately I knew the country very well, for after passing Nazareth I had to follow the winding course of the valleys, owing to low clouds, until the Jordan was reached.

The River Jordan presented an extraordinary sight. The main stream has eroded a narrow channel between wide banks, down which its waters meander in an aimless way, zigzagging a serpentine course across a forbidding plain of great barrenness and desolation. A narrow green belt, somber in color as age, pursues the river through the Jordan Valley, which for the greater part is an arid waste, speckled with sparse and stunted shrubs. The river enters the Dead Sea at nearly 1,300 feet below the level of the Mediterranean.

TRAVELING IN THE AIR BELOW SEA-LEVEL

The Sea of Galilee is, roughly, 700 feet above Dead Sea level, and, as we were flying 500 feet above the river, most of our journey through the Jordan Valley was done at an elevation several hundred feet below the level of the ocean.

On reaching the Sea of Galilee the weather improved. As we passed over the great lake, where deep-green waters rest in a bowl encompassed by abrupt hills, strange emotions passed over me, for below us lay a hallowed place—a scene of ineffable charm, peace, and sanctity.

I now headed the Vimy northeast for Damascus and climbed up to 5,000 feet. Occasional cloud patches passed below us, but the landscape for the most part was drear and featureless, save for a line of snow-clad summits that lay away to the north, Mount Hermon and the Anti-Lebanon Mountains.

The flight through Palestine had been an ordeal; extreme weariness gripped us all, for we were still soaking wet and very cold.

Then once more joy filled our thankful hearts when our straining eyes picked up Damascus, a miraged streak on the horizon of a desert wilderness. The streak became irregular. It grew into a band assuming height and breadth, minute excrescences, and well-defined contours. Color crept in; details resolved, developed, enlarged; a city arose from out the waste of sands, an oasis, glorious, magical, enchanting—this was Damascus. A city almost ethereal in its beauty, rearing a forest of slender minarets and cupolas, surrounded by dense groves and woods, had sprung into being, as if by magic, from the Syrian desert.

WE LAND IN DAMASCUS

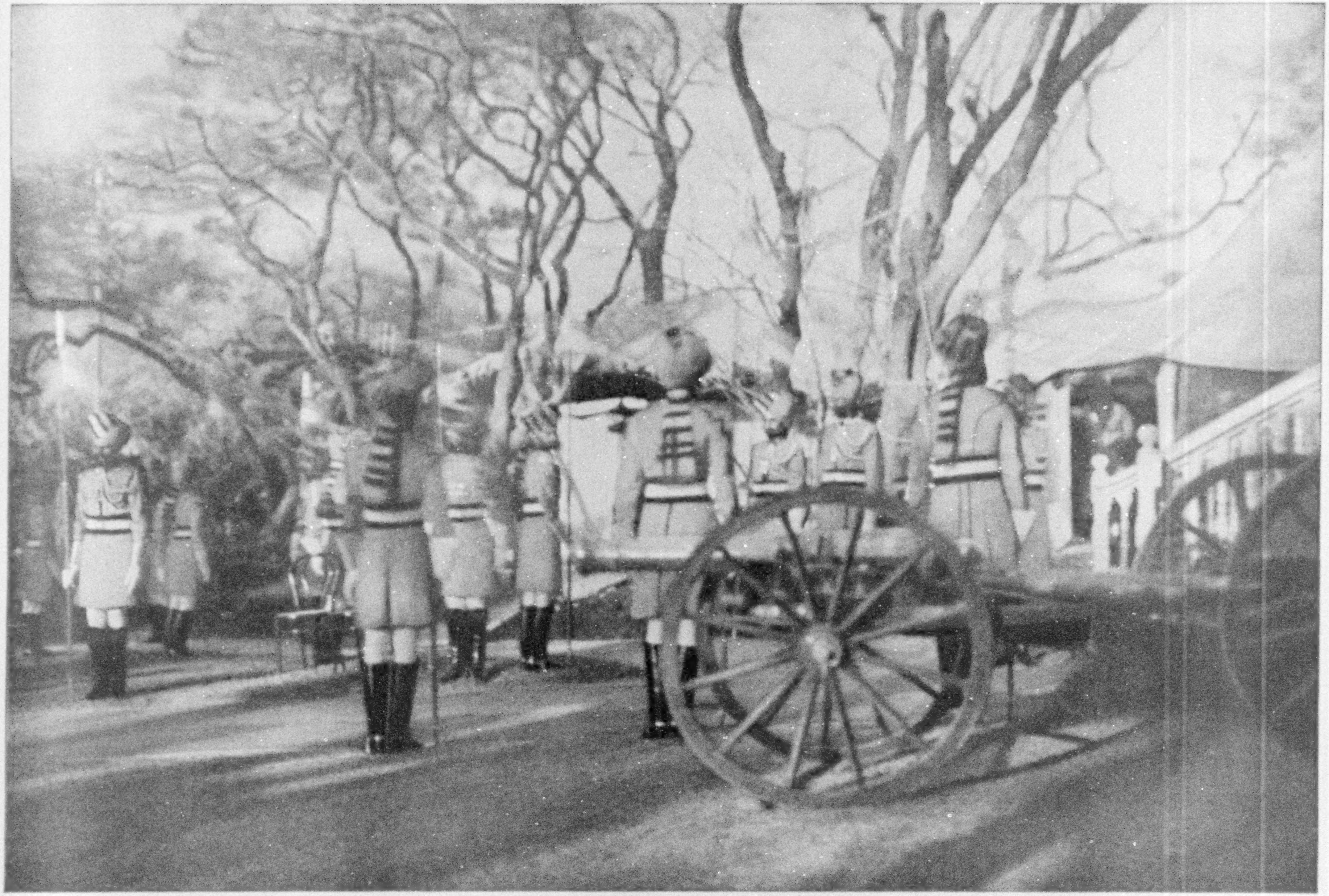
Although one of the world's most ancient cities, age has dealt lightly with Damascus. From the air it appears no older than the blaze of poplars and cypresses that features the gardens and shades the sun-baked mud-houses and mosques. Beyond the city, beautiful gardens and glades extend, gradually dwindling and blending into the desert spaces.

To the north and west rise the multicolored foothills of the Anti-Lebanon Mountains, flanked by the higher peaks with radiant snow mantlings.

Damascus invited and offered a haven of rest. Great was our joy on touching the ground; greater still to be welcomed by old comrades, and to be cared for. The Vimy, too, was looked after. Bennett and Shiers attended to their beloved engines, while I overhauled the controls, and my brother Keith filled up with "shell," to be ready for an early start on the morrow.

A NIGHT IN OLD DAMASCUS

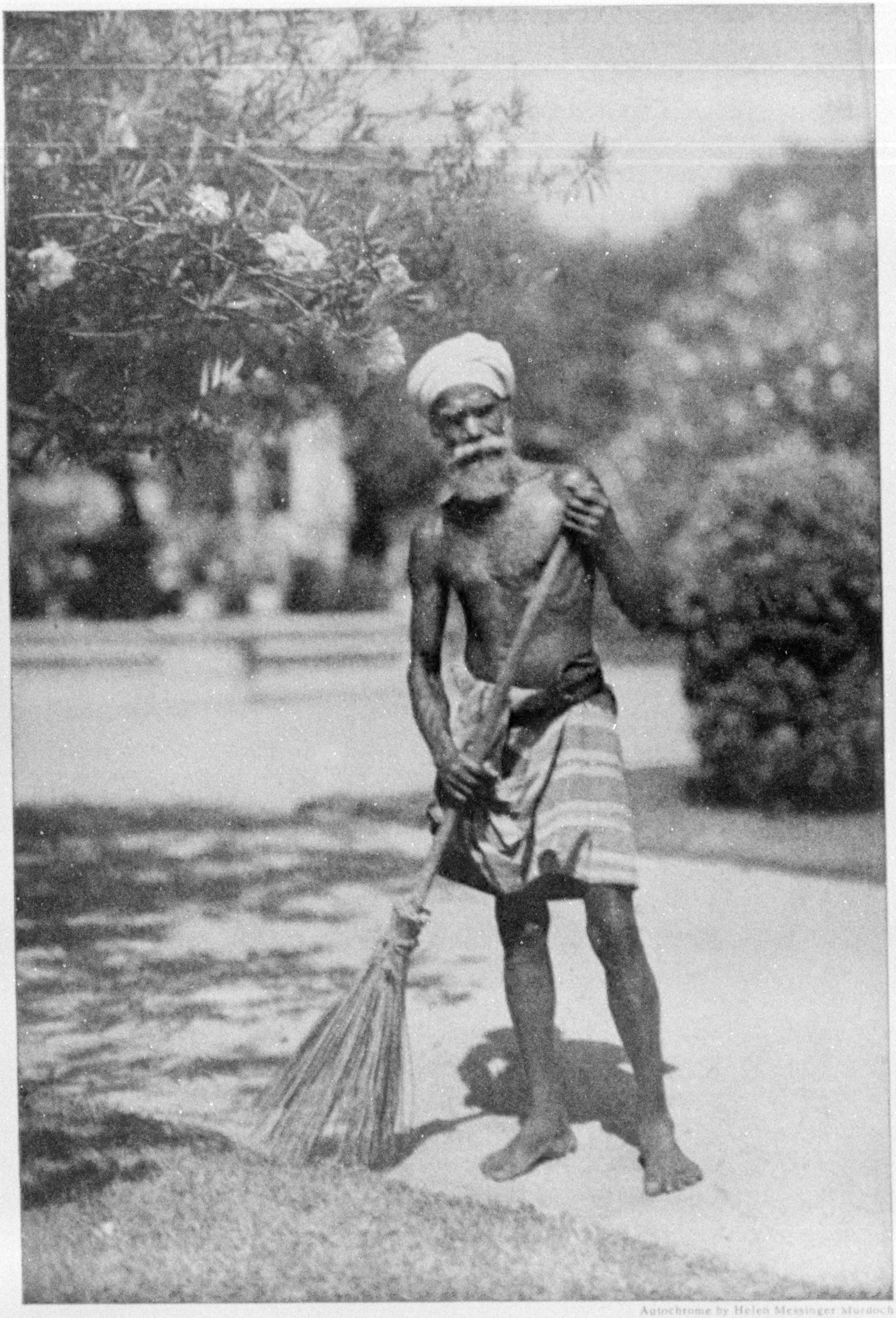
After attending to the machine, we drove in another machine—a Ford—into Damascus and took lodgings at the leading hotel, where the fare was excellent and sleep undisturbed by the parasites common to the country. Damascus is wholly Oriental, though in many ways it is adopting Western fashions and customs. Trams run in the city, and though their speed harmonizes with the indolent habits of the Orient, they seem strangely out of place, as also does the electric light, that sheds its beams of searching and misplaced effulgence in the bazaars and



Autochrome by Helen Messinger Murdoch

HONOR GUARD OF SIKHS, BOMBAY, INDIA

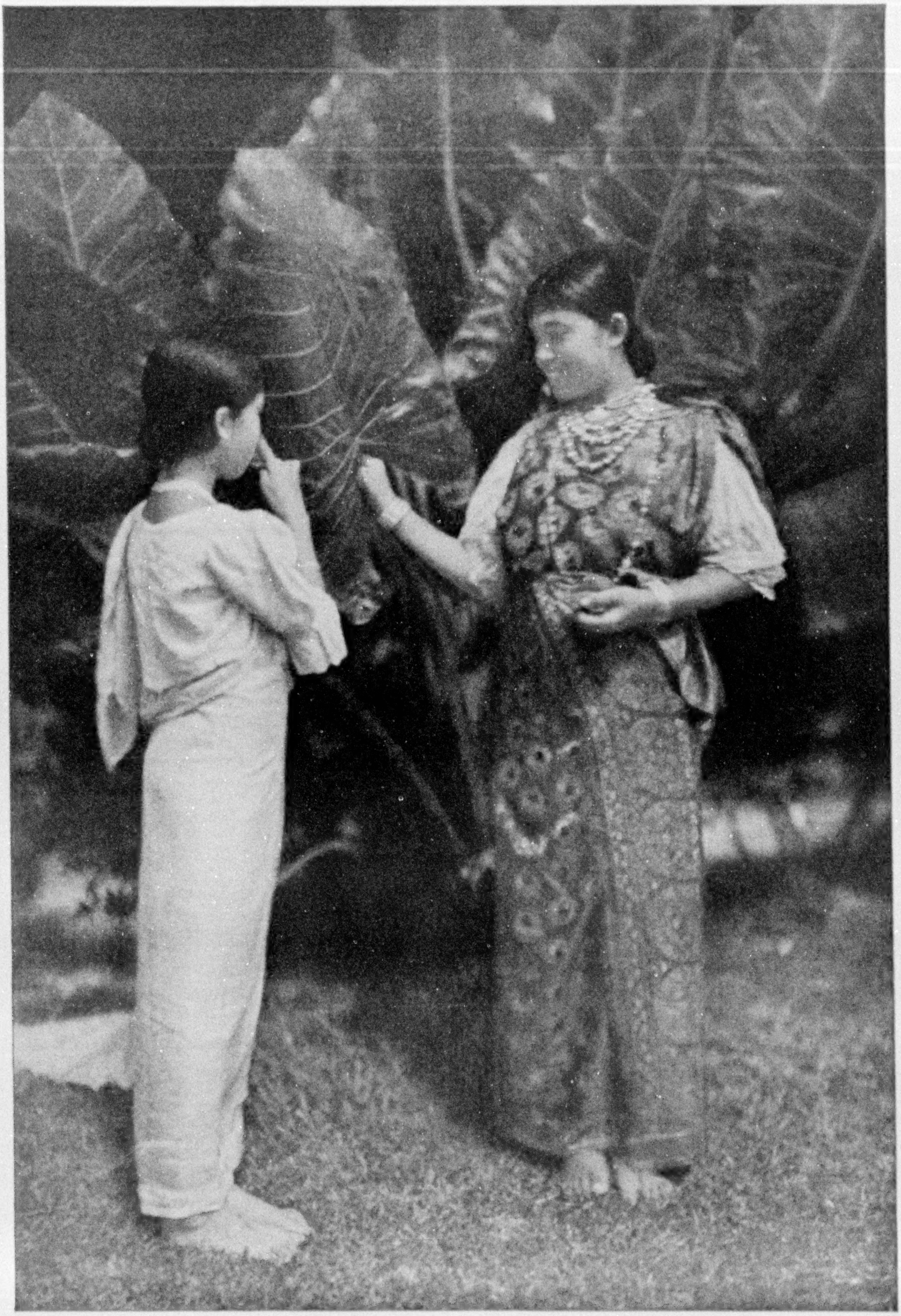
These upstanding fellows are born fighting men, and are considered the finest and most loyal soldiers among the native military forces of the British Empire The Sikh religion rejects alike the teachings of Mohammedanism and Hinduism, but acknowledges one God—the God of all mankind.



Autochrome by Helen Messinger Murdoch

THE MAN WITH THE BROOM

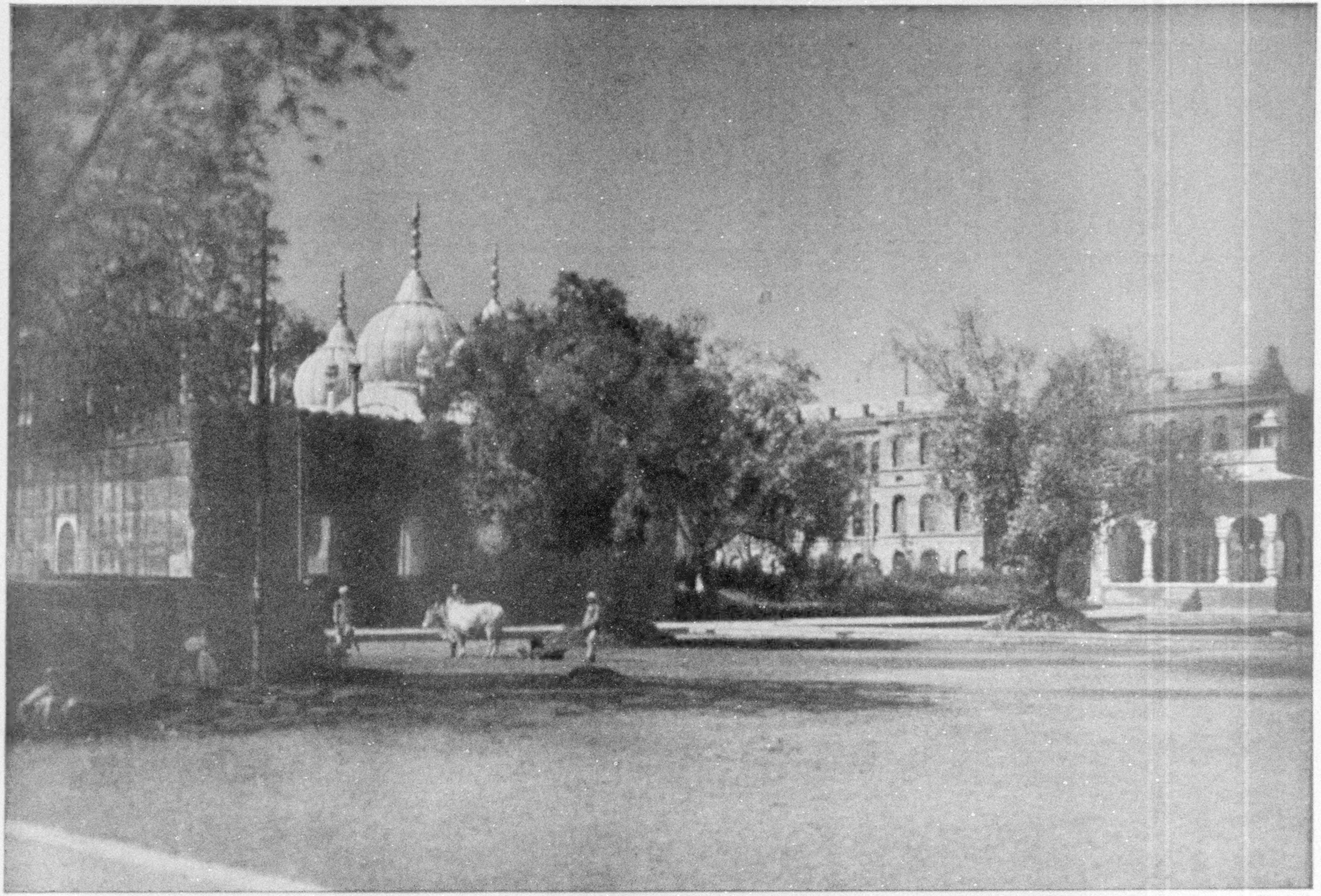
The old Portuguese geographers called Ceylon the "utmost Indian isle" during the days of their nation's ascendancy in India. For more than a hundred years it has been a British possession.



Autochrome by Helen Messinger Murdoch

A MAID AND A BRIDE OF KANDY: CEYLON

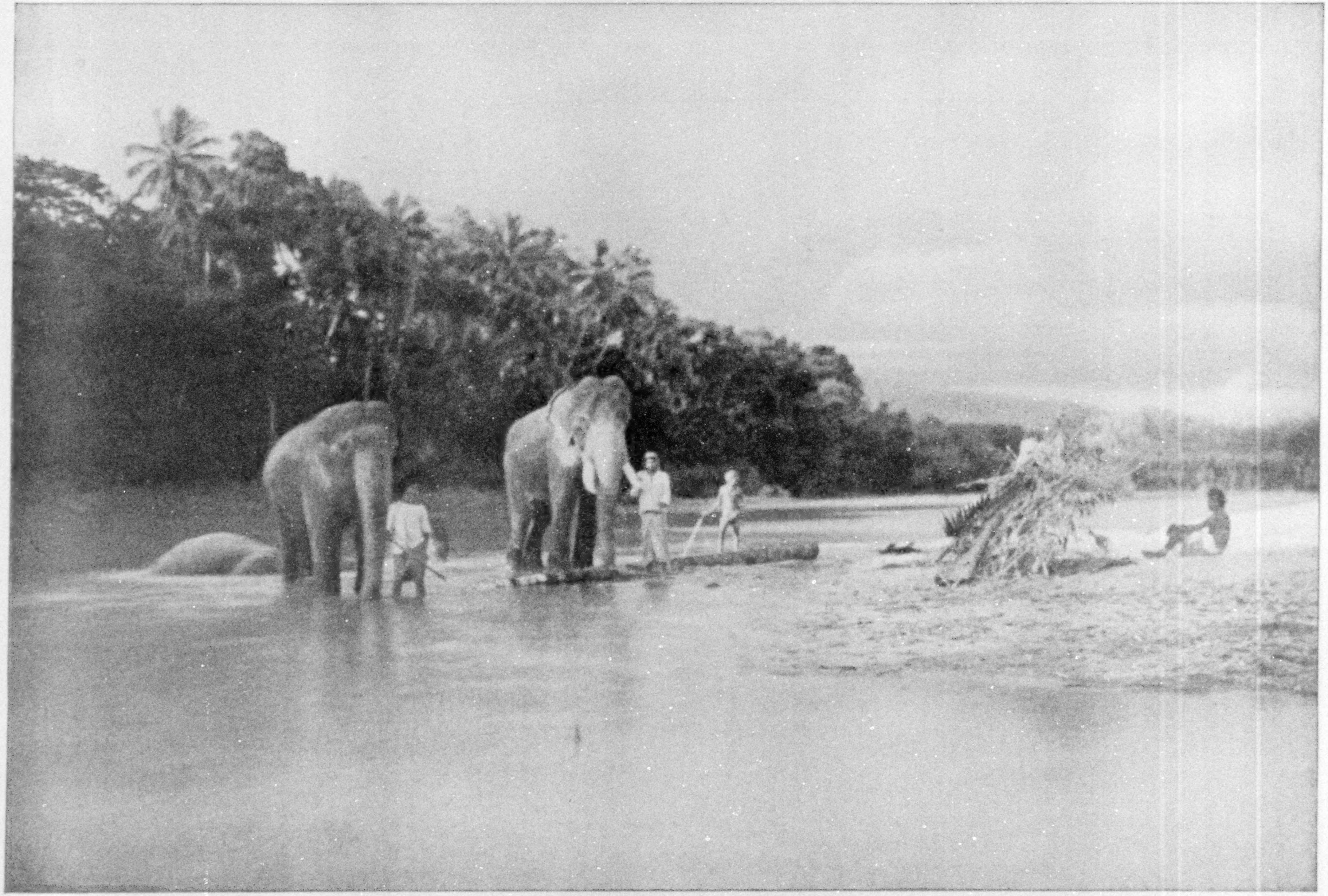
The little girl, still a pupil in school, wears white. The brown sari of the young married woman is a treasured heirloom



Autochrome by Helen Messinger Murdoch

DOMES AND SPIRES OF THE MOTI MASJID, DELHI, INDIA.

This mosque was built in 1659 by the Mogul emperor and defender of the faith, Aurangzeb. It is constructed of white marble and its minarets are covered with burnished copper.



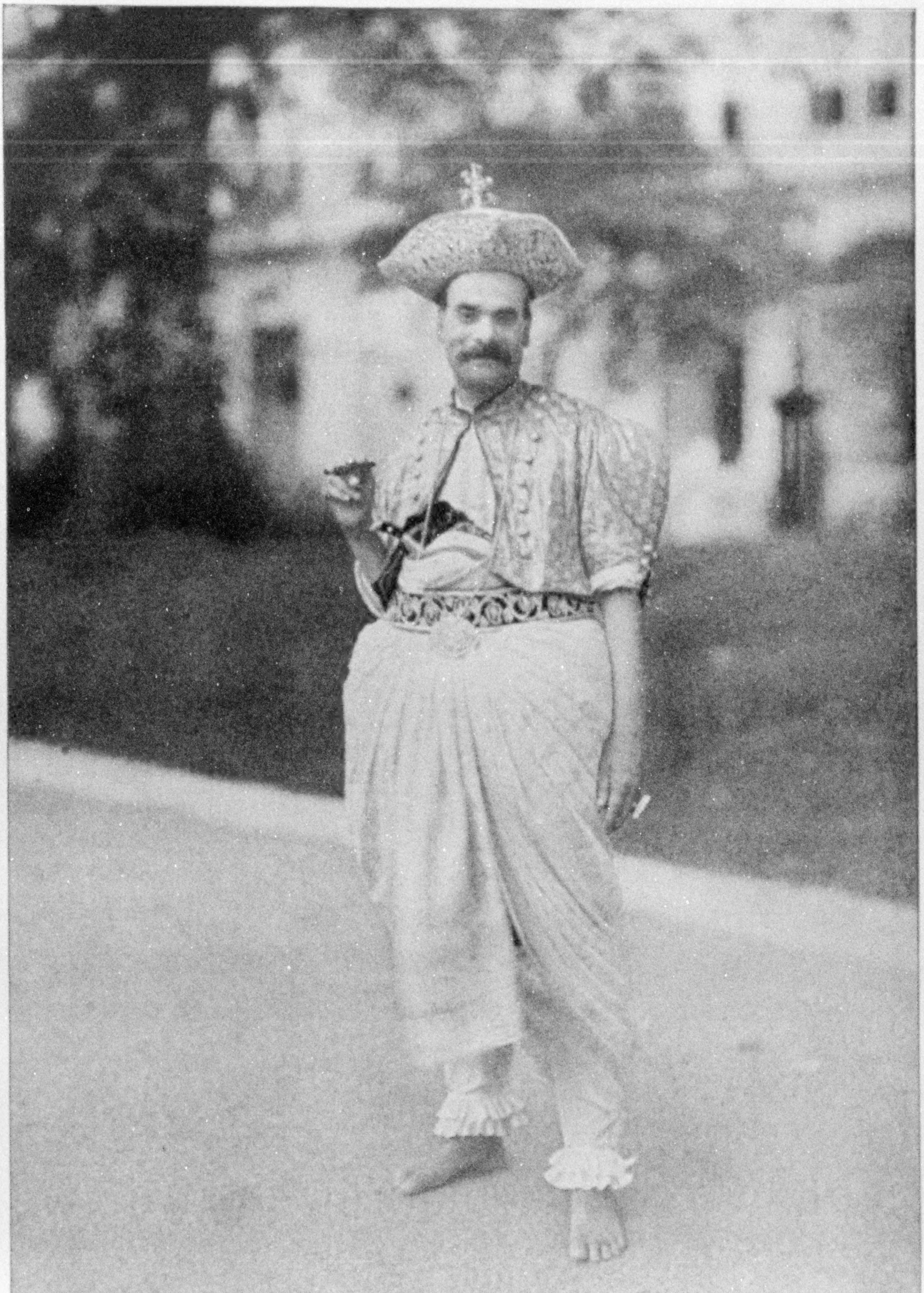
Autochrome by Helen Messinger Murdoch

ELEPHANTS BATHING IN THE MAHAVELIGANGA NEAR KANDY: CEYLON

Nowhere else do the colors of nature challenge the powers of the autochrome more sharply than in Ceylon. There were six elephants in the group, but the mahouts refused to pose them for less than a rupee a head. As two were better than six, the others were kept out of the picture.

WHERE NATURE SEEMS BENT ON OUTDOING ITS OWN RECORD FOR LUXURIANCE

One who has never wandered through a tropical jungle can scarcely believe how little standing room is left where the bamboos and the palms contest for their places in the sun.

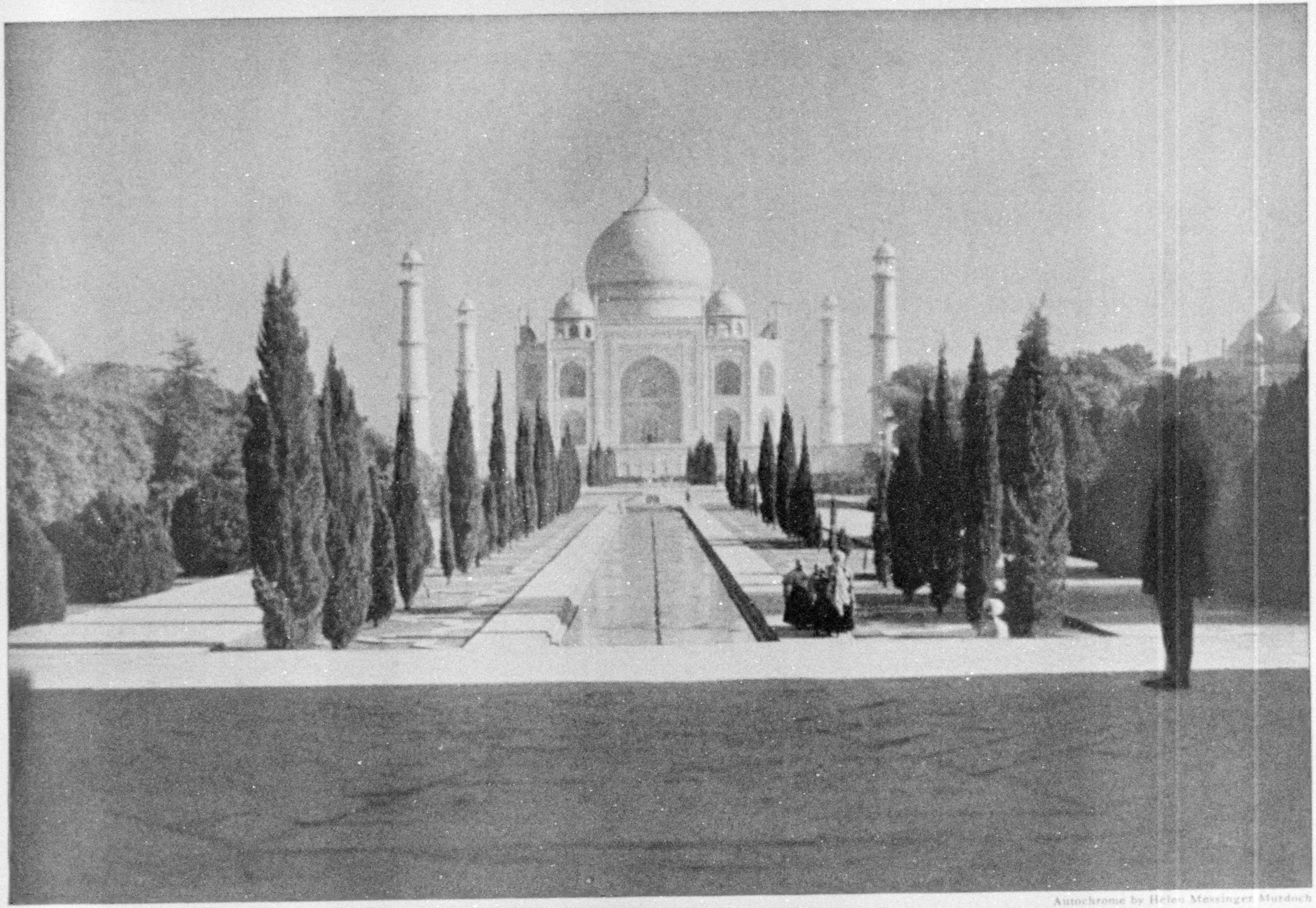


Autochrome by Helen Messinger Murdoch

A KANDY CHIEF ATTIRED FOR THE KING'S BIRTHDAY LEVEE

To the occidental eye the Kandy chieftain's robes of office may appear effeminate, but no one will gainsay their picturesqueness.

XUM



Autochrome by Helen Messinger Murdoch

THE TAJ MAHAL, AT AGRA, INDIA, IN THE EARLY MORNING LIGHT

This alabaster masterpiece is the most beautiful tribute to a woman constructed by man and was built by Shah Jehan in 1629-1650 as a mausoleum to his favorite wife, the Begum Mumtaz-i-Mahal. It represents the supreme achievement of Mohammedan art.

squalid stalls, where shadow, deep shadow, is essential to effect a successful sale.

I looked out of my window before turning in. A myriad spires, misty and intangible, pointed to a heaven brilliant with stars; a faint breeze drifted in from the desert. The atmosphere was laden with mystery and enchantment. I felt contented. The skies promised sunshine, and henceforth the weather would be good!

Conceive my dismay when, on awakening with the morning, I discovered heavy rain falling; still further was I dismayed to find the aërodrome surface rapidly becoming soft, and the wheels of the Vimy sinking in. As there was no sign of the weather clearing up, we greased our tires to assist their passage through the sticky clay, started up the engines, and, to my unspeakable relief, the Vimy moved ahead.

But the take-off was not lacking in excitement. The propellers sucked up water and mud, whirling it in all directions (we happened to be included in one of them), and so we rose into the air, once more to be cut by the lash of the elements. To my intense relief, the storm did not extend more than a score of miles beyond Damascus.

A MUD VILLAGE ON PALMYRA'S RUINS

We were now heading for Tadmur; again the desert extended before us—a rolling expanse of dreary gray sand over which it was some satisfaction to speed at eighty-five miles per hour. Tadmur is a miserable village of mud huts that has sprung up amidst the noble ruins of ancient Palmyra. The modern bazaars are built for shelter among the ancient columns and fragmentary walls of the Temple of the Sun. These magnificent ruins are the bleached skeletons of a glorious past, austere and dignified even in the squalor and meanness that surround them. From Tadmur the route lay east to Abu Kemal, on the Euphrates.

Shortly after leaving Tadmur we observed an encampment consisting of several hundred black goat-hair tents, and gathered around them were vast herds of camels. As we were flying low at the time, our sudden appearance caused a stampede, not only among the beasts, but also the occupants of the tents. They decamped, evidently terror-stricken. We subsequently learned that the camels were the spoils of a victorious raid. Perhaps the raiders thought we were the Judgment!

FOLLOWING THE EUPHRATES

On reaching Abu Kemal we turned southeast, following down the course of the Euphrates. It was a pleasant change, after the interminable desert, to pursue the lazy course of the great river and to pass again over fertile tracts and numerous villages.

The most remarkable of these villages is Hit, not only on account of the ancient city which lies buried here, but because there are several bitumen springs, from which this valuable commodity oozes in vast quantities. Practically every native who owns a boat on the Euphrates has copied Noah, who was commanded to "pitch the ark within and without with pitch."

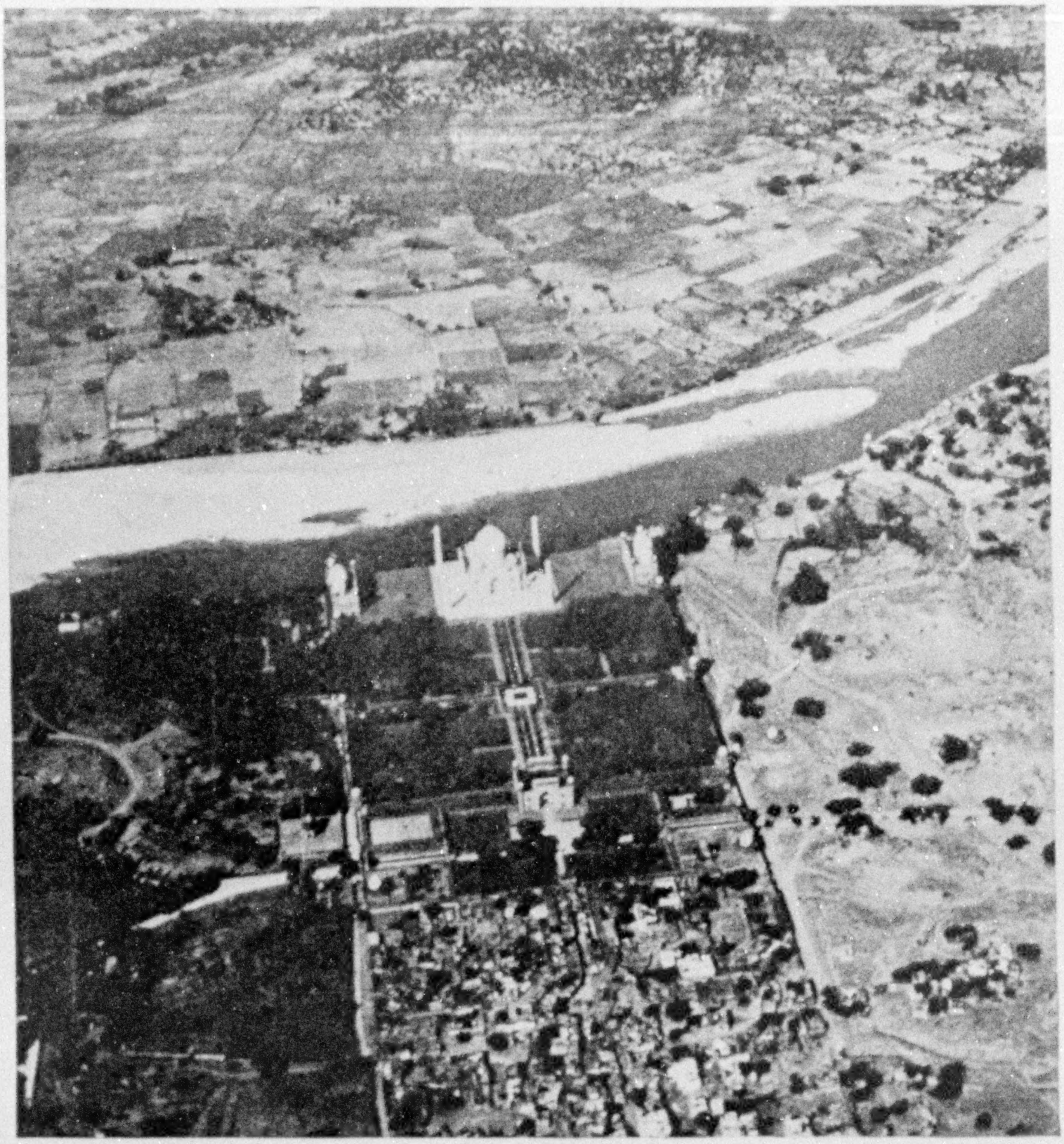
On leaving Abu Kemal we encountered strong head winds, which diminished our speed considerably. I was becoming anxious as to whether we could reach Bagdad before dark, as I was not keen to make a night landing there.

The sun was fast sinking in the west, and as we flew over Ramadie it dipped below the horizon. I decided that there would not be time to do the forty miles to Bagdad before dark. We selected a suitable landing ground among some old trenches, close to a cavalry camp, and landed.

We had landed on the old Ramadie battlefield, which was one of the notable sites of the Mesopotamian campaign. Soon after landing the C. O. of the Indian cavalry regiment came out to greet us, and proffered the hospitality of his camp.

We were delighted to learn there was a small supply of aviation petrol here, and we obtained sufficient to carry us through to Basra without having to land at Bagdad. An Indian guard was mounted over the machine, and the Vimy was securely lashed down for the night.

The O. C. of the 10th Indian Lancers and his staff were thoroughly pleased to meet us, and over the excellent dinner



Photograph by Sir Ross Smith

THE WORLD'S FINEST ARCHITECTURAL GEM SEEN FROM THE SKIES

Of all the remembered scenes in the flight from London to Melbourne, Sir Ross Smith accounts the Taj Mahal, at Agra, India, the most wonderful and beautiful (see text, page 301, and Color Plate VII, facing page 289).

that was prepared I told the latest happenings in London—their home. They were a fine, stout-hearted lot of fellows and greatly we appreciated their hospitality. We felt truly sorry for them, stationed in such a remote, isolated place as Ramadie.

A BLOW IN THE NIGHT

About 11 o'clock that night a heavy windstorm swooped down upon us, and my brother and myself rushed out to the machine. The wind had suddenly changed, and was now blowing hard on to the tail of the machine. The Vimy was in imminent danger of being blown over and crushed.

We turned out fifty men from the nearest camp. They hung on to the machine until we started up the engines and swung her head round into the wind. It was a pitch-dark night, and the gale whirled the sand into blinding eddies, cutting our faces and eyes. One very severe gust caught one of the ailerons and snapped the top balance-wires. This allowed all four ailerons to flap about in a very dangerous manner, and it looked as though they would all be wrenched off before we could secure them.

By weight of arms, however, we eventually managed to secure the ailerons before serious damage was done. At last the machine was turned, facing the wind, and in that position successfully weathered the storm. Throughout the rest of the night the guard hung on to the machine and all stood by.

REPAIRING THE DAMAGE

The storm abated by morning. We found that all the aileron control wires were strained or broken. The sand had choked up everything exposed to the weather, and by the time the damage had been repaired and our tanks filled with petrol it was noon.

For the first time since leaving London we had promise of a good flying day with a following wind. This good fortune atoned for our troubles of the night and for our lack of sleep. We were sweeping along at 100 miles an hour, and in less than thirty minutes Bagdad lay below. Glorious old Bagdad! Bagdad today, faded of all its old glory, is a place of poverty and decay, alluring only through name and association. Yet, in spite of its meanness and squalor, the magic city of Haroun-al-Raschid, the hero of the Arabian Nights, of Aladdin, and Sindbad the Sailor, shall remain immortal.

OVER THE GARDEN OF EDEN

It is hard to believe that the land above which we were now speeding was once the garden of the world. Oh, where is thy wealth and prosperity, fair Babylonia? Despoiled by the ravages of the Ottoman Empire, misruled and wasted by the accursed methods of the Turkish Government, it seems incredible that this void of marsh and waste land was once a country of milk and honey, a land of pomp and luxury that led the civilization of the world.

From a height, the aspect of Bagdad is more inviting than from the ground. A maze of narrow streets, wandering through a tesselated plan of flat roofs, of spires and green splashes of cultivation and date palms, of a great muddy brown river, covered with innumerable little round dots, which on closer investigation resolve themselves into circular, tublike boats—all this is Bagdad, and the impression is pleasing and reminiscent of bygone glory.

A LAND OF MEMORIALS

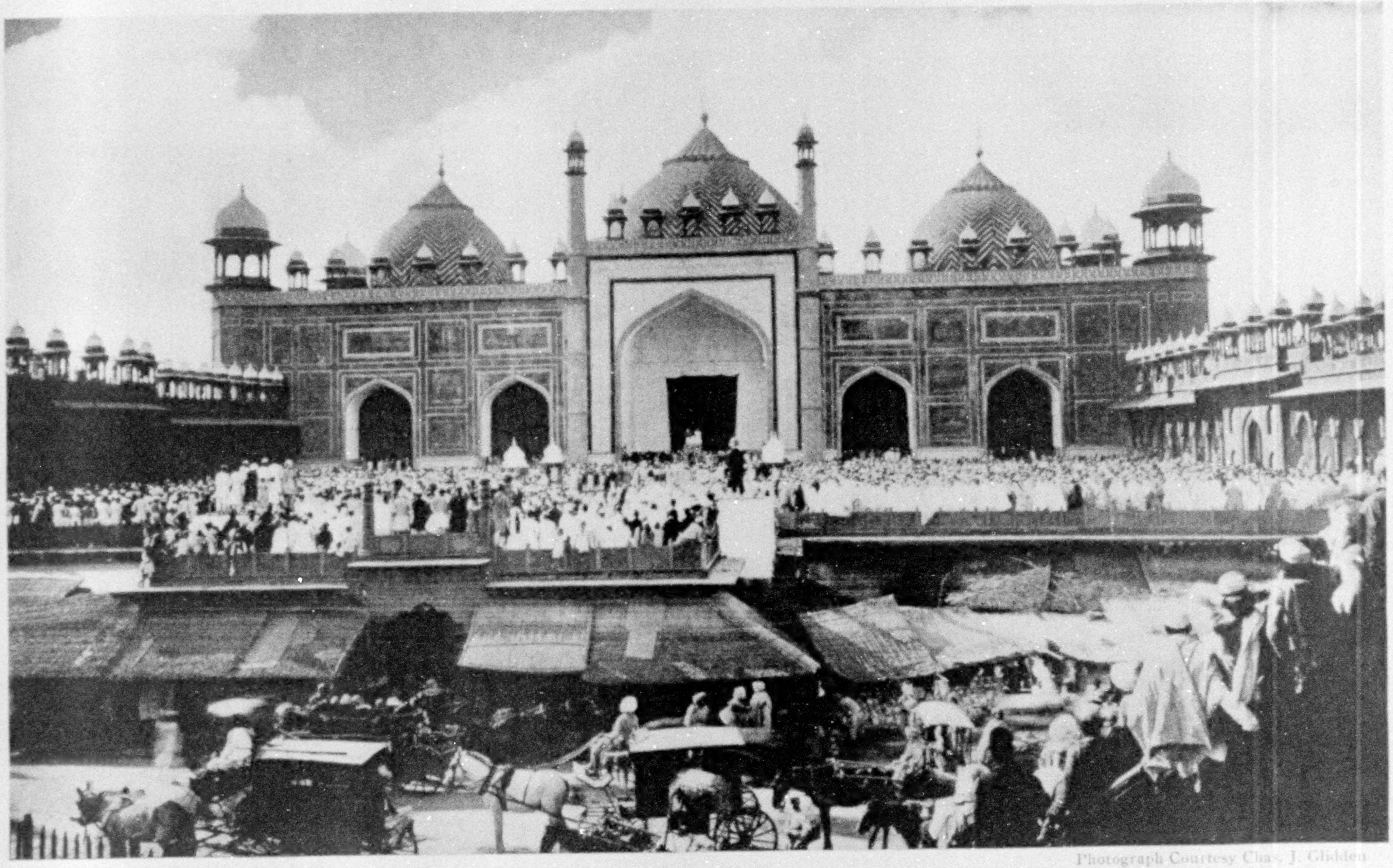
There is but one thoroughfare that stands preëminent today in Bagdad—a wide road which the Turks had cut through the city to make way for the retreat of their routed army before the victorious British under General Maude; and so now may we see the dawn of a new era and fairer days ahead for this outcast land.

Every mile of land and river above which we were passing was a measure of history of valorous effort, mighty deeds, and heroism. The map of Mesopotamia unrolled before us. Here lay the old battlefields of Ctesiphon, Laff, Tubal, the trench systems still being clearly observable.

Kut el Amara, where was enacted the most dramatic and heroic episode of the Mesopotamian campaign, next came into view. For five awful months that little garrison of British men, led and cheered by their beloved general, had held out against the Turk, disease, and the pangs of starvation. The glorious story of the defense of Kut and the surrender is one of those splendid episodes that thrill the heart of every Englishman, and which shall live immortal with the memories of Lucknow, Delhi, Khartoum, Ladysmith, and Mafeking.

IV. Chasing Poulet Across Persia and India

In describing Mesopotamia I am inclined to quote the terse, if ineloquent, account of the British Tommy who wrote of it: "A hell of a place, with two big rivers and miles and miles of dam all between them." Yet the possibilities of development are infinite and the potentialities golden—a land of suspended fertility, where animation and prosperity lie for the time dormant—a wondrous garden, where centuries of neglect and rapine have reaped desolation and bar-



Photograph Courtesy Chas. J. Glidden

A RELIGIOUS GATHERING IN THE COURTYARD OF THE PEARL MOSQUE OF AGRA

This, "one of the purest and most elegant buildings of its class to be found anywhere," was built by Shah Jehan, the same ruler who brought into being the Taj Mahal (see page 290). In the center of the court, here almost concealed by the devout multitude, is a marble pool. During the Indian Mutiny the mosque was used as a hospital.

renness. The land is athirst, but the two great rivers, the Tigris and the Euphrates, move sullenly on, ebbing their life out to the sea. Turn back these tides into the veins of irrigation and the land will be replenished, Eden shall be again, and even the valley of the Nile shall be despised to it.

Exulting in the fair weather and following breeze, we swept over the world at 100 miles an hour. Three thousand feet below, the two great rivers conflux and unite in the Shatt-el-Arab, with the miserable village of Kurnah at the junction—a village built of mud, and its humanity of the same color as the turbid streams that bear the soil of Asia Minor away to the Persian Gulf. Clusters of date palms and a scant belt of vegetation fringe the bank, but beyond a half mile or so there is nothing but the dun-colored wilderness, the miraged sky-line, and the blue canopy where the sun rules king.

All this once was the Garden of Eden. Today it is not a delectable site; but who may speak of the morrow? The waters of the Shatt-el-Arab, heavily impregnated with mud, resemble the outflow from a mud geyser, swirling and boiling; they move oozily forward as their caprice inclines, the silt is precipitated, shallows form, mud-banks come into being, grow into islets, and disappear with the next flood.

BASRA, A HIVE OF ACTIVITY

The flight from Bagdad to Basra took just under three hours. The crazy river barge, probing its way through shallows, rips, and mud, generally takes a fortnight! Basra we discovered to be a hive of activity. It was the main shipping port during the Mesopotamian campaign, and a large military base and aërodrome were still in evidence. The aërodrome stretches to the horizon, and with the British camp extends for miles along the eastern bank (see pages 271-273).

We crossed over to the town in one of the characteristic river boats called mahailas—a Viking vessel strangely and crudely carved at prow and stern, and with sails as multi-patched as the garments of the crew. The town is an unlovely place of strange and variodorous perfumes; so after dispatching mails we hastened back to the Vimy.

As there was a Royal Air Force depot here, I decided to delay a day and allow Bennett and Shiers to overhaul and adjust the engines.

A LONG DAY'S FLIGHT

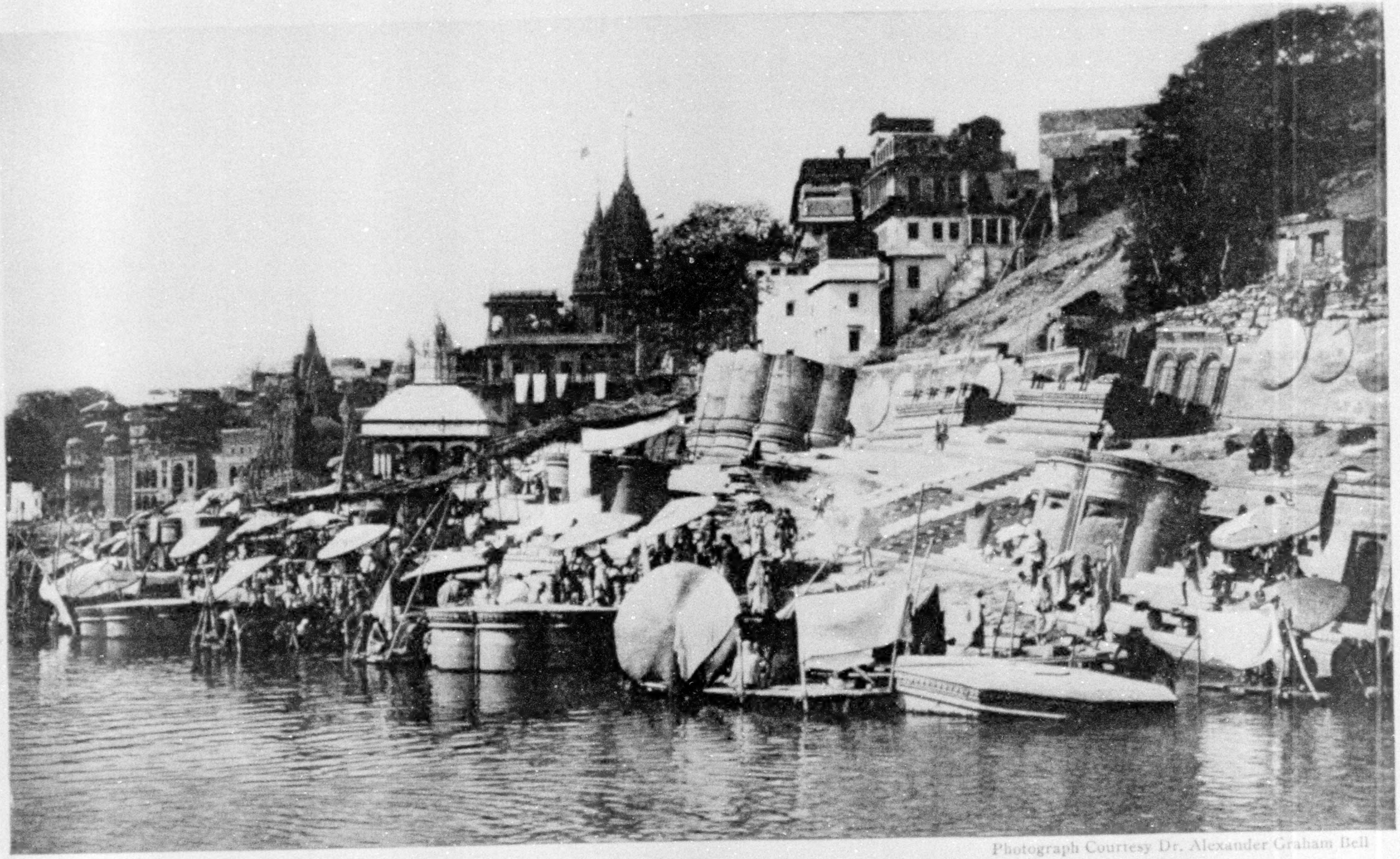
On the morning of November 23 we made a daylight start for Bander Abbas, 650 miles south. Soon after starting, the sun came up from the distant hills; the world threw off its somber gray, and in dawn's fair raiment became beautiful. The delicate shades of pink that flushed the horizon mounted higher and higher until the zenith grew gay; and so another day of the flight had begun.

The sunlight sparkled on our varnished wings, and the polished propellers became halos of shimmering light. Our engines sang away merrily. The Vimy ceased to be a machine and pulsed with life, as if feeling the glory of the morning; my brother scanned the landscape below, plotting off the course on the chart and checking our position from time to time by villages and salient features, remarking how wonderfully accurate the world was created!

Bennett and Shiers had stowed themselves away in the after cockpit and were reclining inside the fuselage with the spare parts, endeavoring to secure well-earned rest from their strenuous efforts of the past few days. As the spare parts crammed all available space, theirs was painful comfort indeed. The dimensions of our front cockpit were of those adequate proportions generally attributed to wedges. The weather continued fine, but for the most part the flight was uninteresting and monotonous.

We passed over Bushire and several coastal villages, but the only really impressive sight was the ruggedness of the coastal belt and the hinterland ranges. Some of the country presents a remarkable sight, and appears as if a mighty harrow had torn down the mountain sides into abysmal furrows. Fantastic-shaped ridges and razorbacks rise precipitously from deep valleys barren of vegetation and desolate of life. Occasionally we passed over small flat plains dotted with abrupt hills and flat tabletops. The whole earth appeared as though some terrific convulsion had swept it and left

XUM



Photograph Courtesy Dr. Alexander Graham Bell

ONE OF THE FAMOUS GHATS, OR LANDING PLACES, ON THE BANKS OF THE GANGES AT BENARES, THE HOLY CITY OF THE HINDUS

The flyers passed over this great city, noted alike for its age, its shrines and temples, and for its innumerable host of deformed beggars, who clutter its streets, soliciting alms from rich Hindus who elect to spend their declining years in its holy atmosphere (see page 304).

in its wake this fantastic chaos of scarred mountains and gouged valleys.

DOWN THE PERSIAN GULF TO BANDER ABBAS

In striking contrast, the shores of this wild scene are washed by the stagnant waters of the Persian Gulf. The coloration of this phenomenal panorama was equally bewildering. The dead expanse of the Persian Gulf, mingled with the mud of the rivers, was an exquisite shade of green, patched here and there with darker areas, where the wind had caught it up into ripples.

Mountainward, the first impression was that all had been molded in yellow clay. A closer survey showed streakings and strata of infinite shades, of which the rust color of ironstone appeared dominant. At intervals the dry beds of waterways cut well-marked defiles from the high mountains to the sea. They stood out like roadways winding through the maze and seeming as if blasted out by the hand of man.

Throughout this terrible country I scarcely observed a possible landing ground, and had our engines failed us it would have meant either crashing or else an immersion in the Persian Gulf. So it was with no small relief that I brought the Vimy to a safe landing at Bander Abbas, where a hearty welcome was extended to us by the British Consul, the Persian Governor, and a great concourse of interested natives.

Although dog-tired, I could not sleep that night. The coming day's trip, I hoped, would enable us to reach Karachi in a non-stop flight of 730 miles. The distance did not perturb me in the least, but the treacherous country and the isolation from civilization in case of a forced landing, and another long stretch of detestable mountain-scored country was in itself enough to give one a nightmare.

The British Consul had prepared an ostentatious-looking document which we were to carry. It commanded the murderous tribes which infested the country to treat us kindly, in case we were compelled to land among them!

Fortune favored us once more with a following breeze and excellent weather. The country was a repetition of that passed over the previous day, and, with the morning sunlight striking aslant, heavy shadows gave the scene the semblance of a mighty rasp.

The engines were perfectly synchronized, and roared away harmoniously; but it is imperative for the pilot to watch every part of his machine, especially the engines. As I sat there hour after hour, I found myself automatically performing the same cycle of observation over and over again.

My supreme difficulty was to keep my sleep-heavy eyelids from closing and my head from nodding. First of all I would look at my starboard engine and see that the oil-pressure gauge and revolution counter were registering correctly; then listen to hear if the engine was firing evenly. Next, glance over the engine and oil-pipe connections and check off the thermometer which indicated the water temperature in the radiators. The altimeter, air-speed indicator, and petrol flow indicator in turn claimed attention.

I would then look up to the port engine and go over the instruments and engine as before; then over the side to scan the landscape, and ever keep an alert eye for a suitable spot in case of a forced landing.

By the time I had completed this performance it would be time to start all over again. When flying over interesting country the monotony of this ceaseless routine is relieved, but where flying over country such as the present stage the only mental stimulus that buoyed us up was the anticipation of rosier times ahead. Often our thoughts were of Poulet, who was somewhere ahead, and we wondered if ever we would catch up with him.

ENTERING THE AËRIAL GATEWAY TO INDIA AFTER A 730-MILE FLIGHT

Frequently we passed over small villages, and our advent instilled terror into the inhabitants and their animals.

For the last 100 miles we left the coast and flew on a compass bearing direct for Karachi, and so we entered the aërial gateway to India after a non-stop flight of eight and a half hours.

The usual procedure of overhauling the engines and machines and refilling our

XUM

A HARBOR SCENE IN CALCUTTA: MORE THAN HALF WAY ON THE LONDON-TO-AUSTRALIA FLIGHT

It was at the race-course outside the city of Calcutta that one of the most terrifying incidents of the trip occurred. Two hawks, flying against the blades of one of the aëroplane's propellers, jeopardized the success of the whole adventure (see text, page 305).

tank with petrol had to be carried out before we could seek rest. This took from three to four hours; and as we had a flight of 750 miles to do in order to reach Delhi next day, it was necessary for us to put 369 gallons of "shell" into the machine. This petrol was in four-gallon tins, which meant that we had to handle, lift up, and filter ninety tins, or well over a ton of petrol (see page 233).

NO ROMANCE IN POURING PETROL

My brother and I generally filled the tanks, while Bennett and Shiers worked on the engines. It was not much fun, after piloting the machine for eight and a half hours in the air, to land with the knowledge that we had to lift a ton of petrol, besides doing innumerable small jobs, before we could go off to rest.

In addition, we had to run the gauntlet of functions and ceremonies, and it was difficult to make folk understand that work had to be done. We deeply appreciated every one's generous kindness, but I fear that on some occasions people must have thought me very discourteous.

The first news that greeted us on landing at Karachi was gratifying. Poulet was at Delhi, only a day's flight in the lead! This was a great surprise, for we fully expected that he would be well on his way to Singapore. From now onward added zest would be given to the flight, for I intended to pursue the chase in keen earnest. Already I considered the race as good as won, for the Vimy was superior both in speed and range.

We had hoped for a good rest at Karachi, but the local Royal Air Force officers had arranged a dinner, and it was not before "the very witching hour" that we turned to bed. Three hours and a half later we were called to continue the flight. This was to be the longest non-stop we had undertaken. Nine hours' flight should land us in Delhi, 750 miles away.

ABOVE THE INDUS

After circling above the aërodrome we turned east, heading straight into the golden sun that was just rising above the horizon. A low ground haze that changed into a golden mist as the sun mounted higher hid the earth from view. Passing over Hyderabad, the vapors rolled away and we had a grand view of the River Indus. Once more we entered the monotony of the desert. For the next three hours we flew steadily onward, pursuing the railroad track across the dreary Sind Desert.

It was a joy to reach Ajmere, a delightful little city, beautifully situated in a basin of green hills. The country beyond is for the most part flat—a vast verdant carpet irrigated from the great rivers. Practically from the time we had reached the African coast, when on our way to Cairo, the flight had been across deserts or desolate lands. Now the new prospect that opened ahead invited and attracted.

During the afternoon flying conditions became very boisterous, and the turbulent atmosphere tossed the Vimy about like a small vessel in a heavy sea. This I also accepted as a welcome diversion, for the flights of the past few days had cramped me in one position, and now I was kept actively on the move keeping the machine straight and fighting the air-pockets and bumps into which we plunged and fell.

DELHI IN THE DISTANCE

We first noticed Delhi from fifty miles distance—a white streak in a haziness of green plain. Quickly details became apparent, and soon the streak had germinated into a considerable town.

I circled above Delhi to allow the people to see our machine, which had established a record by arriving thirteen days after leaving London—a distance of 5,870 miles. We climbed crampily out of the machine and were welcomed by General McEwan, the Royal Air Force chief in India, and many other old friends.

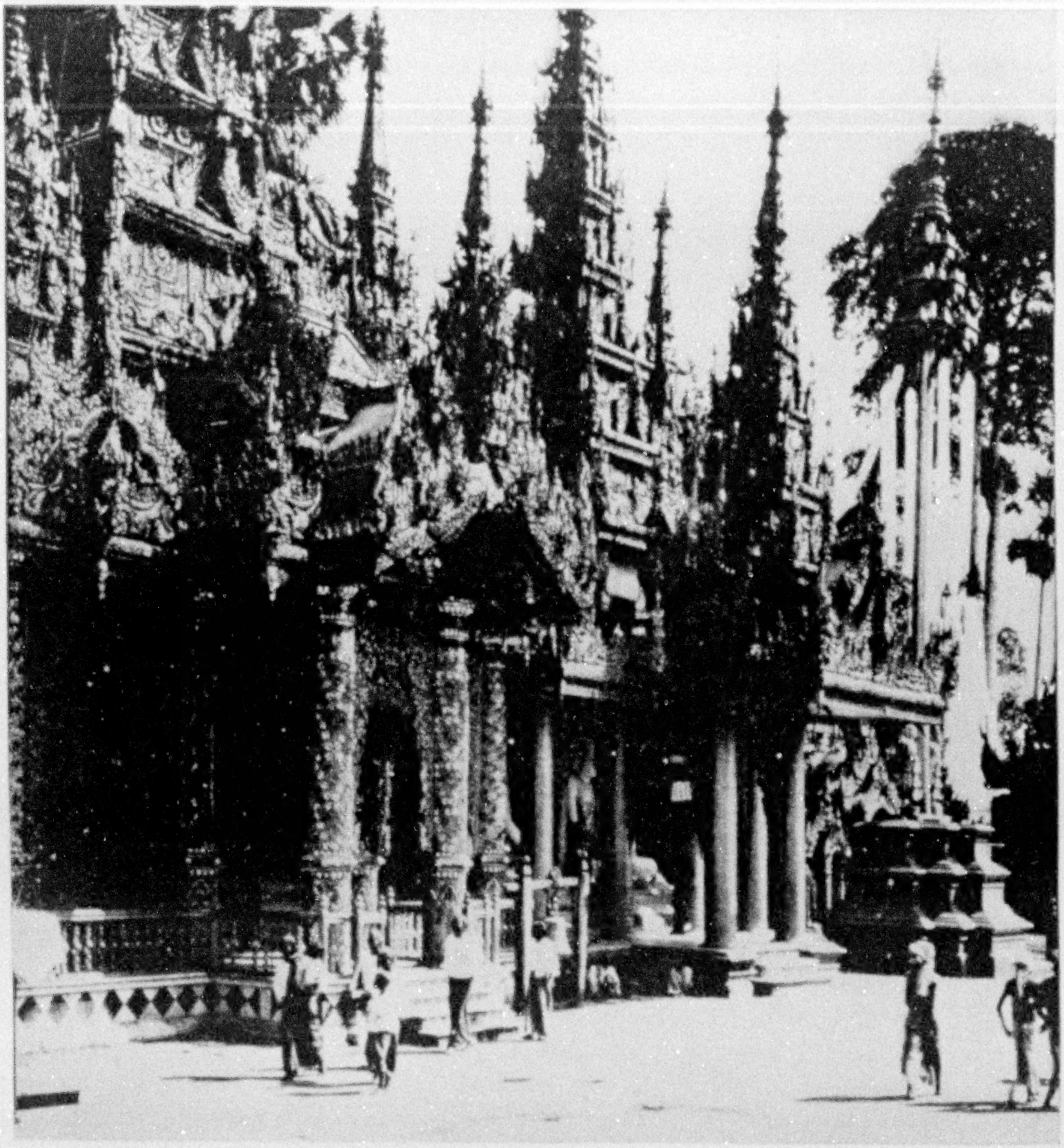
I regretted that I was quite unable to reply to their kindly expressions, as I did not hear them. The roar of the exhausts for nine consecutive hours' flying had affected my ears so that I was quite deaf.

After several hours my hearing returned, and it was to learn that Poulet had left the same morning for Allahabad. Great excitement prevailed, for one aëroplane had departed and another

XUM

THE LOFTY GOLDEN PILE OF THE SHWE DAGÔN, THE CENTER OF BURMESE RELIGIOUS LIFE IN RANGOON

In no city along the route to Australia was the arrival of the Vimy awaited with keener interest than in Rangoon, the capital of Burma and third seaport of the Indian Empire. When the first news of the departure of the aviators from London appeared in the Rangoon papers a large crowd of natives straightway assembled on the race-course, expecting to see the aëroplane arrive in a few hours. As the time for the actual arrival drew near, people began to congregate, bringing their food and beds, intent upon holding a festival for the duration of the stay of the airmen. The Vimy was the first aëroplane Rangoon had ever seen. An hour after its arrival, Poulet, the French flyer, arrived in his Caudron (see text, page 307).



Photograph by E. B. McDowell

ONE OF THE SHRINES OF THE SHWE DAGÔN PAGODA: RANGOON, BURMA

This, the finest and most venerable place of worship in all Indo-China, attracts pilgrims from Cambodia, Siam, Korea, and Ceylon, as well as from all Burma.

had arrived on the same day, both engaged in a race half-way around the world! After attending to the machine we dined at the R. A. F. mess, thoroughly tired but extremely happy. Half the journey was completed and Poulet was within range.

FROM BASRA TO DELHI

We had left Basra at 6 a. m. on November 23 and arrived at Delhi fifty-four hours later, covering a distance of 2,100 miles. Out of the fifty-four hours we had spent twenty-five hours ten minutes actually in the air, and in the balance we had overhauled the engines and machine twice, and had by our own efforts filtered two and three-quarter tons of petrol into the machine. I had intended pushing on to Allahabad next day, but on arrival at the aërodrome we were feeling the effects of the past strenuous days so severely that I decided that rest was imperative. We took it—in the form of the proverbial change of work—and, putting in six good hours on the machine, made every-

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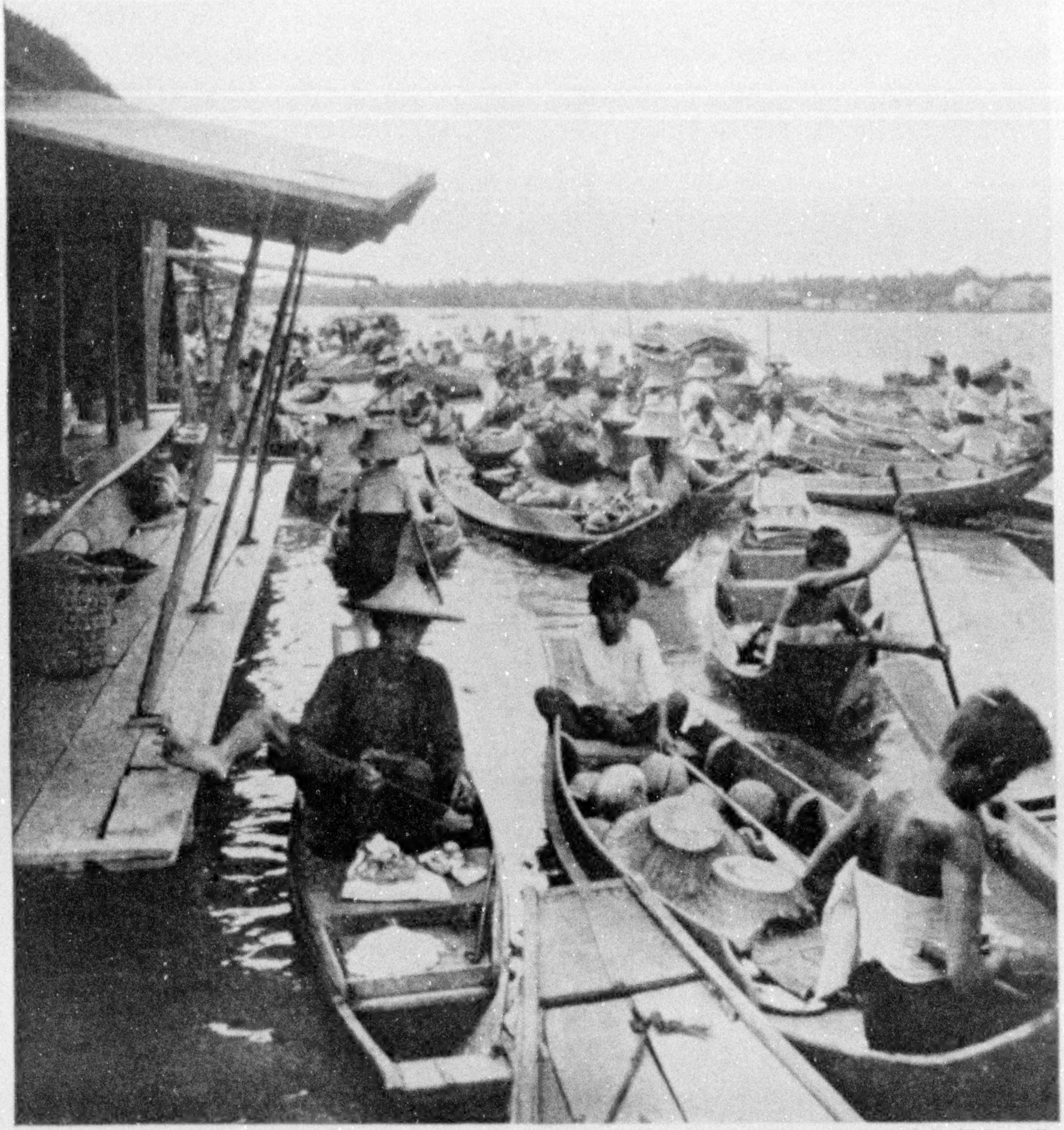


Photograph by E. B. McDowell

THE BOAT MARKET ON THE ME NAM RIVER, BANGKOK, SIAM

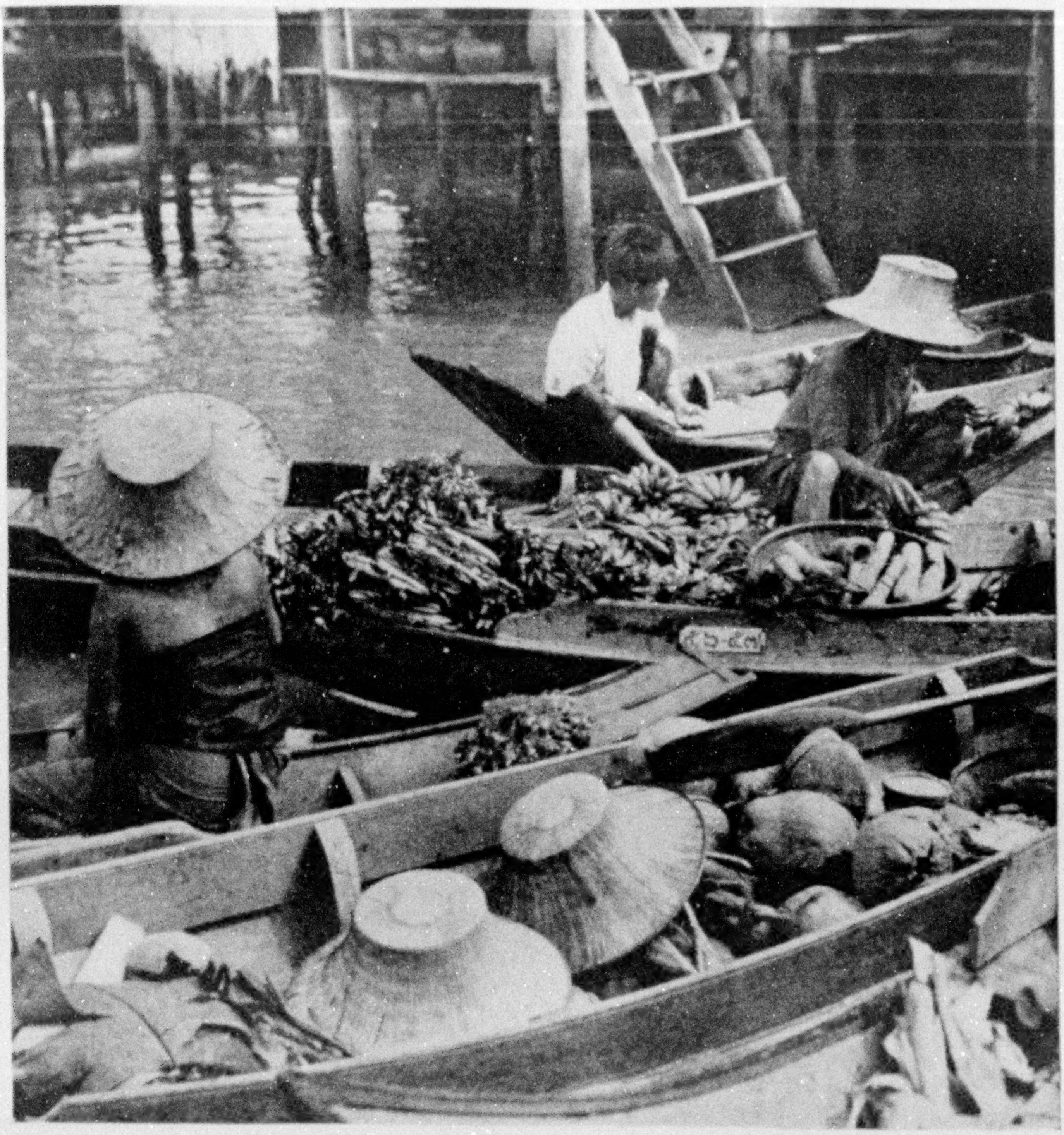
Until modern times Bangkok was built largely on floating pontoons and on piles at the edges of many canals, and it still faintly suggests an oriental Venice.

thing ready for an early morrow start. Toward evening my brother and I drove into the city sight-seeing.

As I had been to Delhi during my flight to Calcutta with General Borton, I played the guide, and an enjoyable ramble through this future capital diverted our thoughts from the Vimy for the moment and enabled us to relax.

Further diversion, with less relaxation, was provided by the native driver of a car we hired. In the language of the realm in which we had been living, he navigated full out and nearly crashed us on several occasions, in his desire to show what a pilot he was. I declare that I "had the wind up" far more often on this bit of journey than during the whole flight. However, the casualties were few and the fatalities nil, and we paid him off at the R. A. F. quarters.

At 4.30 next morning I tumbled stiffly out of bed on the insistence of a Yankee alarm-clock. Oh for another day off! But by the time the others had uncoiled and emerged into the early Indian dawn,



Photograph by E. B. McDowell

WHERE THE BANGKOK HOUSEWIFE BUYS HER VEGETABLES

In 1760 Bangkok was a mere agricultural village on the banks of the Me Nam; today it is a splendid capital with 500,000 inhabitants.

I felt again the keenness of the chase. A friendly R. A. F. pilot came up in a Bristol fighter and flew with us for a few miles along the course of the Jumna.

Half an hour later the oil-gauge surprised us by setting back to zero, and we made an unexpected landing at Muttra, to find that it was happily only a minor trouble—the slipping of the indicator on its spindle. And so into the air once more, and on to Agra—Agra the city of the Taj Mahal.

Of all the remembered scenes, wonderful and beautiful, that of the Taj Mahal remains the most vivid and the most exquisite. There it lay below us, dazzling in the strong sunlight—a vision in marble. Seen from the ground, one's emotions are stirred by the extraordinary delicacy of its workmanship. Viewed from 3,000 feet above, the greater part of its infinite detail is lost, but one sees it as a whole. It lies like a perfectly executed miniature or a matchless white jewel reclining in a setting of Nature's emeralds (page 290).

XUM

Photograph by E. B. McDowell

ONE OF THE MANY GROTESQUE STATUES OF THE TEMPLE OF WAT CHANG: BANGKOK

It seems incongruous to think of this sort of art with electric lights, but Bangkok is well illuminated, and the Vimy's mechanics worked all night by electric lamps in this city, grinding the valves of their engines.

We hovered lazily around, exposed our photographic plates, and swung off on our course. In the vastness of space through which we were speeding, the magnificent monument became a toy . . . . a mote . . . . a memory. New scenes, villages, and towns rose from the unreachable brink ahead, grew into being, passed beneath, then out over the brim of the world behind us.

We were crossing the vast plains of central India, a great flat tessellation of cultivated patches that gave an impression of the earth being covered with green, brown, and golden tiles. These multitinted patches were framed with brimming channels carrying the irrigation waters from the great river.

A BULL ATTACKS THE VIMY

Allahabad was reached after four and a half hours, and we eagerly but vainly searched the aërodrome for a glimpse of Poulet. There were several hangars on the aërodrome, however, and we thought that his machine might be under cover.

Photograph by Theodore Macklin

DANCING GIRLS OF SIAM

The Siamese accorded the aviators the warmest hospitality upon their arrival at the Don Muang aërodrome, 12 miles north of Bangkok, the national capital.

On landing we were informed that he had left that same morning for Calcutta.

There is a considerable garrison stationed at Allahabad, and the commandant, fearing that a deformity might overcome us through being cramped hand and foot in the machine, had arranged an active function called a Jazz. Unfortunately, we were unable to test the efficiency of this form of exercise, though we appreciated the thoughtful hospitality of our hosts.

There was great excitement at the aërodrome next morning. While we were taxi-ing to the far end, preparatory to taking off, a fine bull broke on to the ground, and as we swung round to take off he charged head on toward the machine. The position, though ridiculous, was extremely hazardous. No doubt, to quote the celebrated railway engineer, it would have been "bad for the coo," but a collision would also have been extremely "bad for the Vimy."

I frightened him for the moment by a roar from the engines. Evidently he took the roar for a challenge, and stood in front of the Vimy, pawing the ground and bellowing defiantly. At this point a boy scout rushed out from the crowd to move the monster, and, much to the amusement of ourselves and the crowd, the bull changed his intention and turned on the hero. Our brave toreador retreated to the fence, pursued by the bull.

THE ARRIVAL AT CALCUTTA

We took advantage of the diversion and made a more hurried ascent than usual. What became of the scout I do not know, but as we circled above I noticed that the bull was still in sole possession of the aërodrome.

Once more pursuing the course of the

Photograph by Albert L. Godoy

A TRAVELING RESTAURANT IN SINGAPORE, MALAY PENINSULA

The successful landing of the Vimy at Singapore was accomplished by a resort to acrobatics. The improvised aërodrome being too small for the landing and "take-off" of a machine as large as the Vimy, one of the mechanics clambered out of the cockpit and slid along the top of the fuselage down to the tail-plane. His weight dropped the tail down quickly, with the result that the machine came to a halt within 100 yards after touching the ground (see page 322).

Jumna as far as Benares, we headed southeast and followed the railroad to Calcutta. Forty miles north of Calcutta we came above the River Hooghly.

Here and there factories and jute mills came into view, with villages clustering around them. The villages grew dense and became the outskirts of a great and expansive city—a mighty congestion of buildings, white, glaring in the sun; green patches and gardens, thoroughfares teeming with people, a vast fleet of shipping, of docks and activities—and Calcutta slipped away beneath us.

Thousands of people had collected on the race-course, at the far side of the city, to witness our arrival, and when we landed it was with great difficulty that

© Photograph by F. O. Koch

A PRIMITIVE OIL MILL USED FOR PRESSING COCONUTS ON THE MALAY PENINSULA

While flying along the Malay Peninsula, the Vimy successfully outrode a monsoonal storm after several narrow escapes from disaster (see text, page 315).

the police kept back the multitude of natives that surged around the machine. A barrier was at last placed around the Vimy, and soon we became the center of a compact mass of peering faces, all struggling to get closer and obtain a better view. The elusive Poulet, we learned, had moved off the same morning for Akyab.

PAST THE HALF-WAY MARK

That night, after the usual overhaul of engines and filling up with petrol, we stayed with friends and slept well. We had crossed India and were now more than half-way to Australia.

Our departure next morning from Calcutta was marked by an incident that to the layman may sound insignificant, but it might easily have spelled disaster to us. Thousands of natives and a great many distinguished white people came down to see the start. The race-course is really too small for a machine as large as our Vimy to maneuver with safety, and I was a trifle nervous about the take-off; but the surface was good, our engines in fine trim, and she rose like a bird.

A NARROW ESCAPE FROM DESTRUCTION BY HAWKS

Then came our narrow escape. A large number of kite hawks were flying round, alarmed by the size and noise of this new great bird in their midst. When we had cleared the ground by about ten feet two hawks flew across us at an angle; they seemed to become confused and turned straight into us, one striking the wing and the other flying straight into the port propeller. There was a crash as if a stone had hit the blade, and then a scatter of feathers.

It may not sound very dreadful—except for the hawk—but as a matter of fact it was a breathless, not to say a terrifying, moment, for we fully expected to hear the crash of broken propeller blades.

We were at the time flying straight for the high trees, and, had the propeller broken, nothing could have saved us from a terrible crash. However, more hawks were circling about, and in endeavoring

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MALAY CHILDREN OF SINGAPORE

When the aviators reached Singapore they found the heat intense. Coming from the cold of the English winter, they felt it severely (see text, page 322).

to avoid them I almost crashed the machine on the tree-tops. By a very narrow margin indeed we cleared them, and I was deeply relieved when we had climbed to 1,000 feet and were clear of the pestilent birds. I marveled that our propeller stood the impact, for a very trifling knock will cause the disruption of a propeller when running "full out," and so in an extremely high state of tension. (I have known so tiny an object as a cigarette end thrown carelessly into a propeller to cause the whirling blades to fly to pieces!)

On looking over the machine I noticed one of the hawk's wings had become pinned in the rigging, and we secured it after the day's flight as a souvenir of a hairbreadth escape.

Calcutta marked the completion of the second stage of our journey, and from now onward the route would be much more difficult and hazardous. We had had the benefit of R. A. F. aërodromes and personnel at almost every landing place, but henceforth we would have to land on race-courses or very small aërodromes. Also, I knew that the only possible landing places right on to Port Darwin were at stated places hundreds of miles apart, and that in the event of engine trouble our chances of making a safe forced landing were very slender.

I had originally intended flying from Calcutta to Rangoon race-course in one flight, but as the next day, November 29, was a Saturday, and I was informed that a race meeting would be held at Rangoon on that day, I decided to stop at Akyab.

We were now passing above a dreaded span of country, the sundarbans, where engine trouble would have meant the undoing of all our efforts and labor. The mouth of the Ganges here frays out into a network of streams, producing a jigsaw of innumerable islets and swamps. We breathed much more freely after we had reached Chittagong, a place I had reason to remember well, through having spent four days there the previous year, when our ship caught fire and was blown up (see page 230).

From Chittagong we followed the coast-line of Burma, and eventually reached Akyab. My brother peered over the side as we circled above the aërodrome and showed symptoms of great excitement, while Bennett and Shiers waved joyfully from their cockpit and pointed down to the ground. They indicated a small machine near the center of the field. It was Poulet!

V. THROUGH CLOUD AND MONSOON TO SINGORA

Poulet was the first to greet us on landing. He came forward with a cheery smile and outstretched hand—a true sportsman, the hero of a gallant and daring enterprise. I was deeply interested in inspecting Poulet's machine, which was drawn up alongside the Vimy. In proportion, the contrast was reminiscent of an eagle and a sparrow. The Vimy towered above the tiny Caudron, which appeared altogether too frail and quite unsuited for the hazardous task these two courageous fellows had embarked upon. I had a long talk with Poulet and his mechanic, Benoist; they made fun of their adventures and intimated that theirs was a novel and exciting method of touring the globe.

We agreed to fly on together the next day to Rangoon, but when morning arrived, as we still had some work to complete on the machine, Poulet set off, and by the time we were ready he had an hour's lead. No aëroplane had ever landed at Rangoon before, and naturally I was very keen to win the honor for the Vimy. For the first 100 miles I followed the coast-line southward and did not observe a single landing place in case of necessity. The coast, for the most part, fringes out into vast mangrove swamps, while farther inland the country becomes mountainous, with rice-fields checkering the valleys and every available irrigable area. The hills are densely wooded and very rugged.

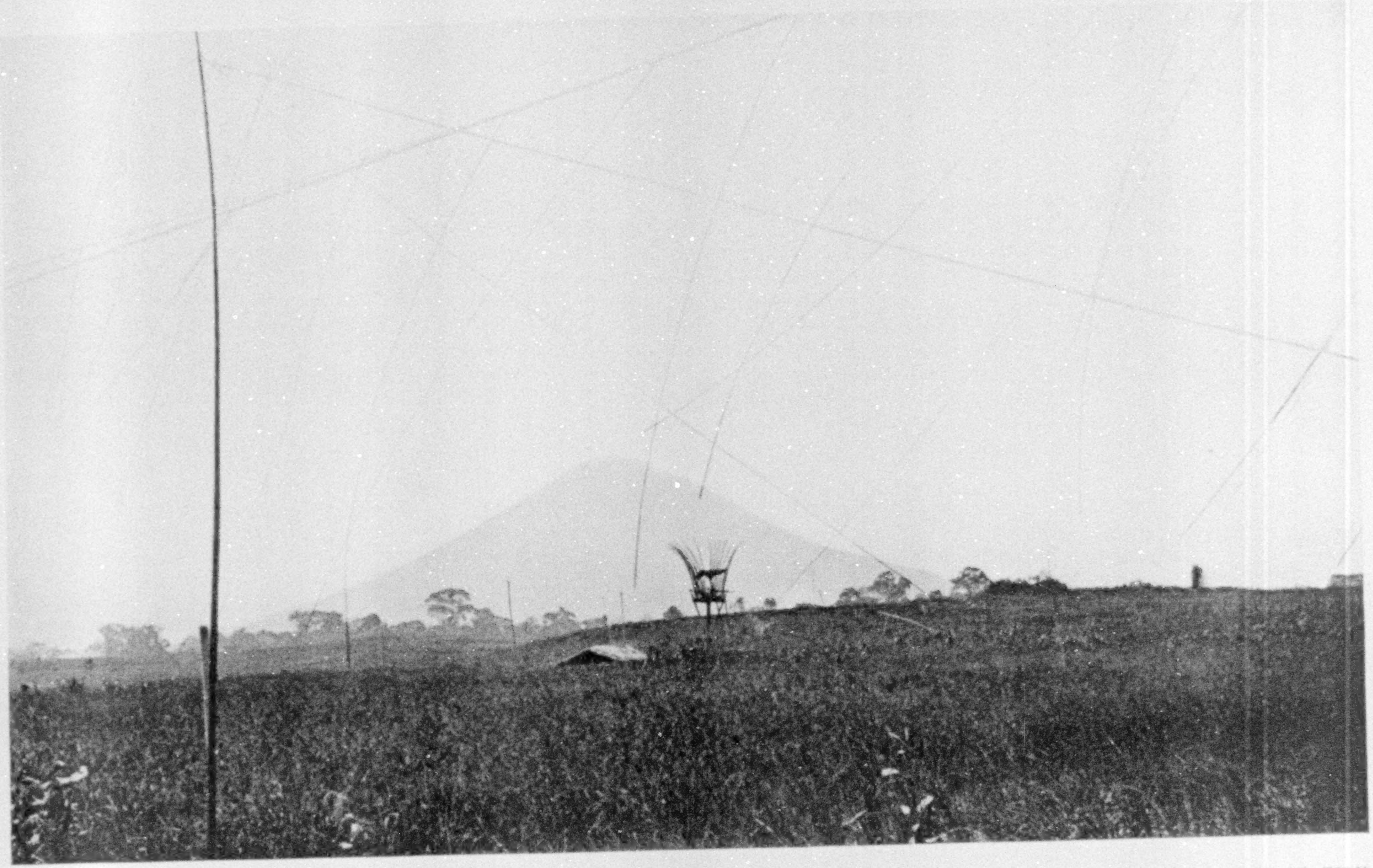
Flying east, we crossed a low mountain chain, and on the other side found the Irrawaddy River. We followed down its course as far as Prome. From here the railroad guided us on to Rangoon. I had no difficulty in locating the landing ground—the race-course, a green patch framed by a compact ring of cheering humanity.

THE RACE TO RANGOON

We came to earth midst tempestuous cheering, and were welcomed by the Lieutenant-Governor of Burma, Sir Reginald Craddock, and Lady Craddock. We were told that no race meeting had been so well attended as the present, nor had the betting been so widespread. The multitudes had massed to witness two aëroplanes racing half-way across the globe. To them the race was more than novel; it was a great event in their lives, for few indeed of the vast assemblage had ever seen an aëroplane.

As flying conditions from Akyab had been boisterous, we in our high-powered machine had a great advantage over Poulet, and in spite of the hour's handicap at the outset, we succeeded in reaching Rangoon an hour ahead of him. Poulet's arrival was the signal for another burst of cheering, and he was welcomed no less warmly than ourselves.

The police experienced great difficulty in clearing the race-course that evening, as many of the natives had brought their food and beds, intent on holding a festival for the duration of our stay. I was told that when the first news of our departure from London appeared in the local papers, and the fact that we intended calling at Rangoon became known, a large crowd of natives straightway as-



THE STRINGS AND BAMBOO USED TO SCARE BIRDS FROM THE RICE-FIELDS OF SUMATRA RESEMBLE THE WIRES OF A RADIO STATION

From a primitive watch tower (see upper illustration on page 310) long strings are run to all parts of the field. To these strings are attached light bamboo poles and bits of cloth. Whenever feathered marauders appear the watcher in the tower strikes the pole to which a string is attached, causing the latter to dance and thus frighten the birds from the grain.

sembled on the race-course, expecting to see us arrive in a few hours. Later, when the news of our reaching Akyab was noised abroad, a multitude camped overnight on the race-course, so as to make sure of witnessing our arrival.

A GOOD OMEN

That night we were the guests of Sir Reginald and Lady Craddock, who did everything possible for our comfort and insisted that we should go to bed early. It was the first time such a suggestion had been made to us, and, as we were very weary, we deeply appreciated their kindly consideration.

There is a strange lizard in the East which makes a peculiar noise, like "tuk-too," and it is a popular superstition that if one hears this sound repeated seven times, good luck will follow. That night, just before going to our room, a lizard "tuk-tood" seven times. The omen was good and we slept peacefully.

We had arranged with Poulet to start off together next morning and keep company as far as Bangkok. The Vimy was considerably faster than the Caudron, but by throttling down and maneuvering, it would be possible to keep together. The way to Bangkok lay across high ranges and dense jungle, and the mutual advantage in making the journey together over this unfrequented and practically unknown country, should a forced landing have to be made by one of us, was obvious.

Traffic fills the highways before sunrise in the East, and a considerable portion of it was moving toward the race-course. A great crowd of interested natives swarmed over the aërodrome, and the police and troops were already busily engaged clearing them off prior to our departure. We started up the engines, took leave of our kind friends, and waited for Poulet. Poulet had some difficulty with his machine; and as it was a warm morning and our engines were beginning to get hot, I took off, intending to circle above the aërodrome until Poulet arose on the wing.

The take-off was not without a thrill. As a matter of fact, to this day it is a mystery to me that we ever left the ground. The race-course was much too small for so large a machine as the Vimy and heavily laden as it was. It had barely attained flying speed when a fence loomed up in front of us. The Vimy just scraped over, but ahead were trees and buildings. I acted instinctively. The undercarriage brushed the tree-top, and danger was past. It was over in a breathless moment; but had the machine been but a single foot lower, disaster must have overtaken us. How slender is the cord that holds success from failure!

I circled above the race-course for twenty minutes; but, as Poulet had not yet left the ground, I concluded that he must be experiencing engine trouble, and so reluctantly we had to push off without him.

We flew due east to Moulmein, immortalized in Kipling's famous ballad, "On the Road to Mandalay," and as no aëroplane had ever flown above this land before, Sergeant Shiers, in words worthy of the great poet, said it was fine to be flitting through air that had never smelt a blanky exhaust!

LOST IN CLOUDS ABOVE THE MOUNTAINS

The maps we carried of this country were very poor and sadly lacking in detail, but they indicated that a 7,000-foot mountain range had to be crossed before reaching Bangkok.

After leaving Moulmein we headed southeast over country rapidly becoming mountainous; but, instead of encountering lofty summits, a mighty cloud bank, that seemed to reach to heaven and bar the entire prospect in the direction of our course, extended before us. The monsoon season was now due, and I concluded that this would be one of the initial storms. Somewhere in that dread barrier lay the high peaks over which we must cross, and I admit that I was afraid of the prospect. As time wore on, the storms would grow in frequency and intensity, so I decided to plunge ahead.

The clouds rested down to 4,000 feet, and we were flying just beneath them. Somewhere ahead lay the mountains that had to be crossed, rearing their summits another 3,000 feet higher. Our maps indicated a pass which we tried to find, and so we started off along a deep valley. At first it looked hopeful, but after five min-

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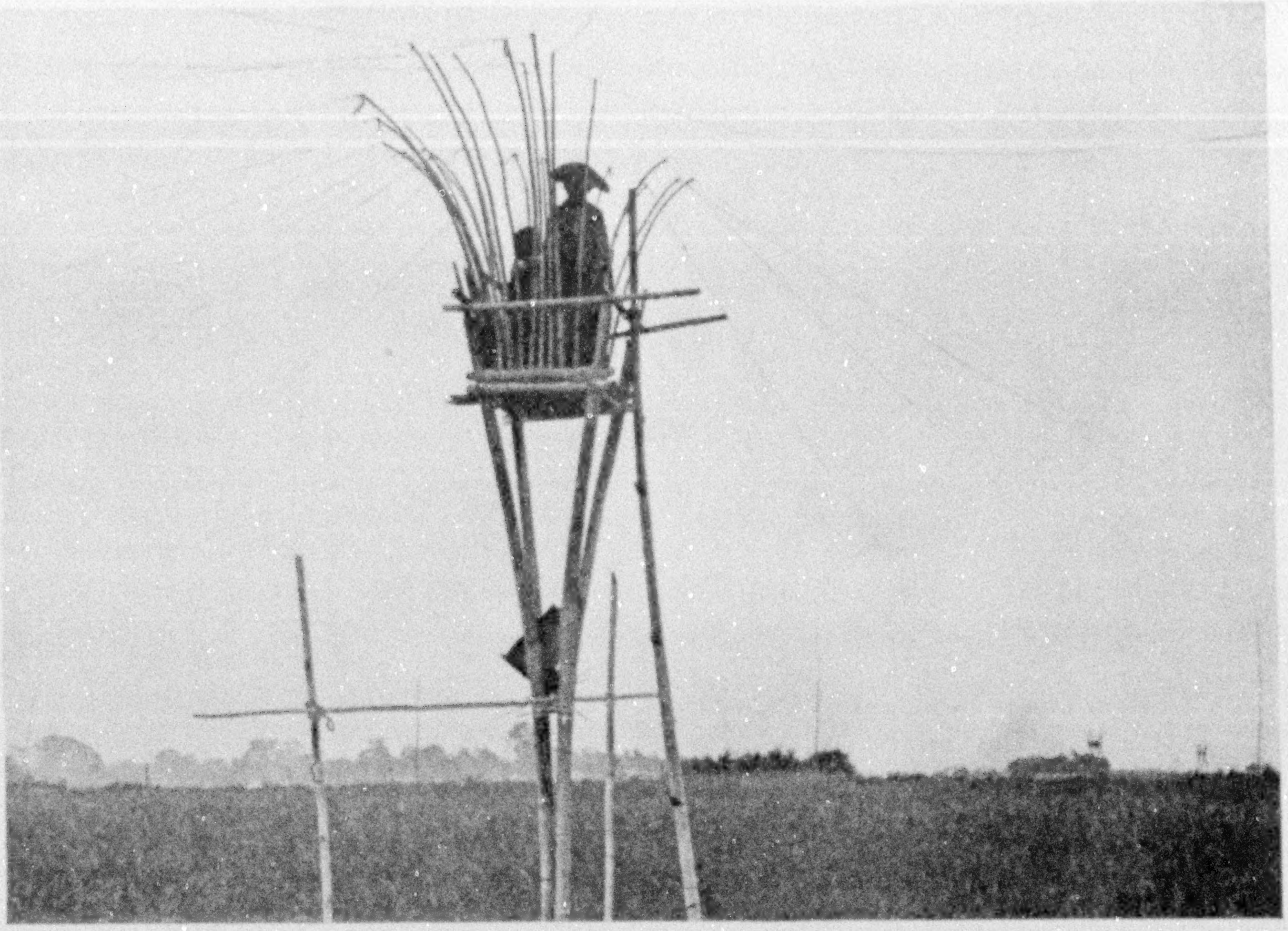
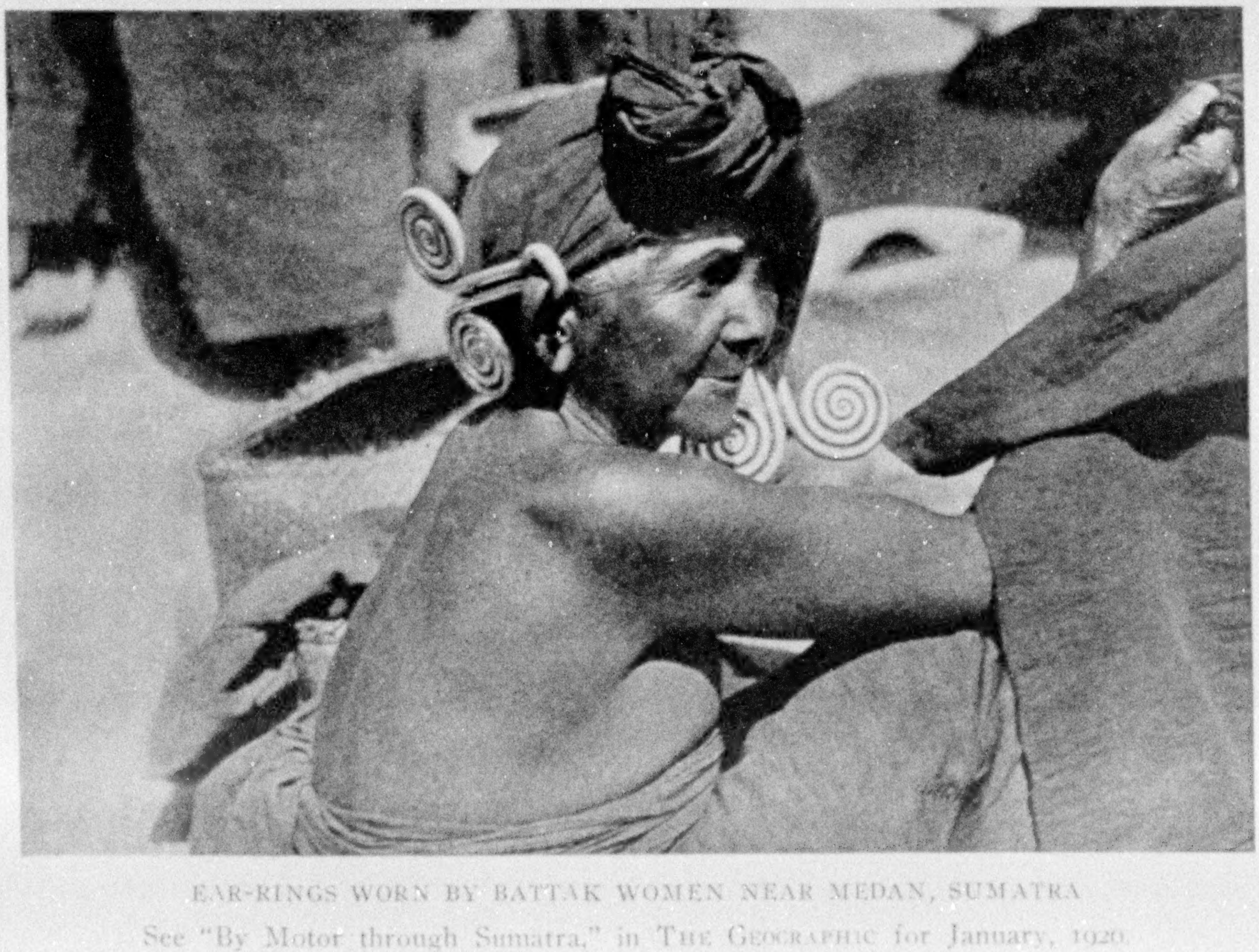


A BATTAK WOMAN AND BOY DRIVING BIRDS OUT OF THE RICE-FIELDS NEAR MEDAN, SUMATRA (SEE ILLUSTRATION ON PAGE 308)



EAR-RINGS WORN BY BATTAK WOMEN NEAR MEDAN, SUMATRA

See "By Motor through Sumatra," in THE GEOGRAPHIC for January, 1920.

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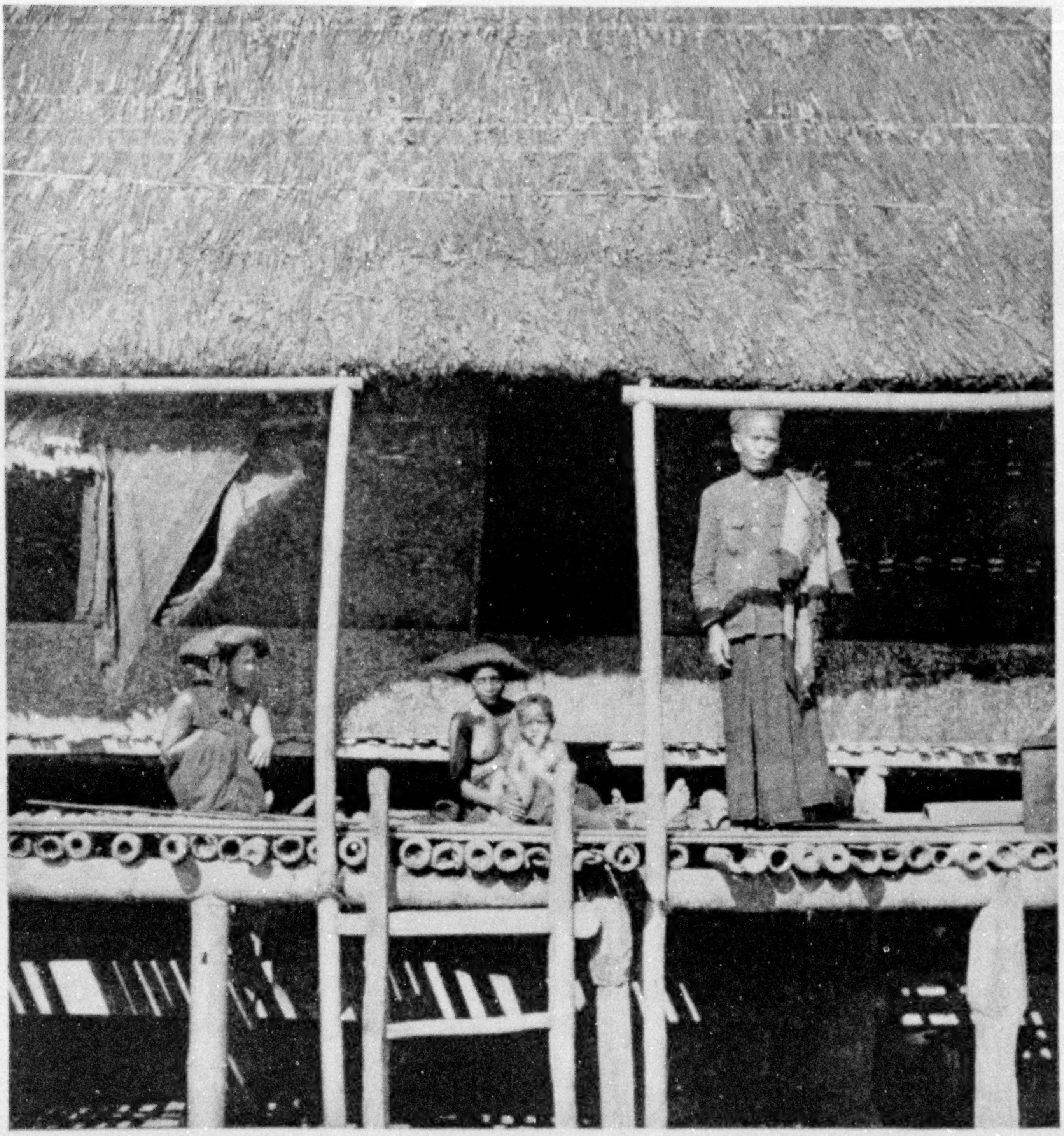

A FAMILY GROUP ON THE VERANDA OF A BATTAK HOUSE NEAR MEDAN, SUMATRA

The aviators "bumped across" the Equator off the eastern coast of Sumatra shortly after leaving Singapore.

utes' flying the cliffs narrowed in, and, fearing I might be trapped in a tapering dead end, I turned the Vimy about. There was just sufficient room in which to effect the maneuver.

After a consultation with my brother, we agreed that our safest course was to climb above the cloud-mass or at least to an altitude sufficiently high to clear the mountain tops, and barge our way through the mist. At 9,000 feet we emerged above the first layer; but eastward the clouds appeared to terrace up gradually, and in the distance there extended still another great wall, towering several thousand feet higher.

OUR MACHINE REACHES ITS "CEILING"—11,000 FEET

Before starting off over this sea of clouds, my brother took observations with the drift indicator, and we found to our dismay that we would have to fight into a twenty-mile-an-hour head wind. He gave me the compass bearing to fly on, and away we went once more, with the world lost to view beneath us. It reminded me of our first day over

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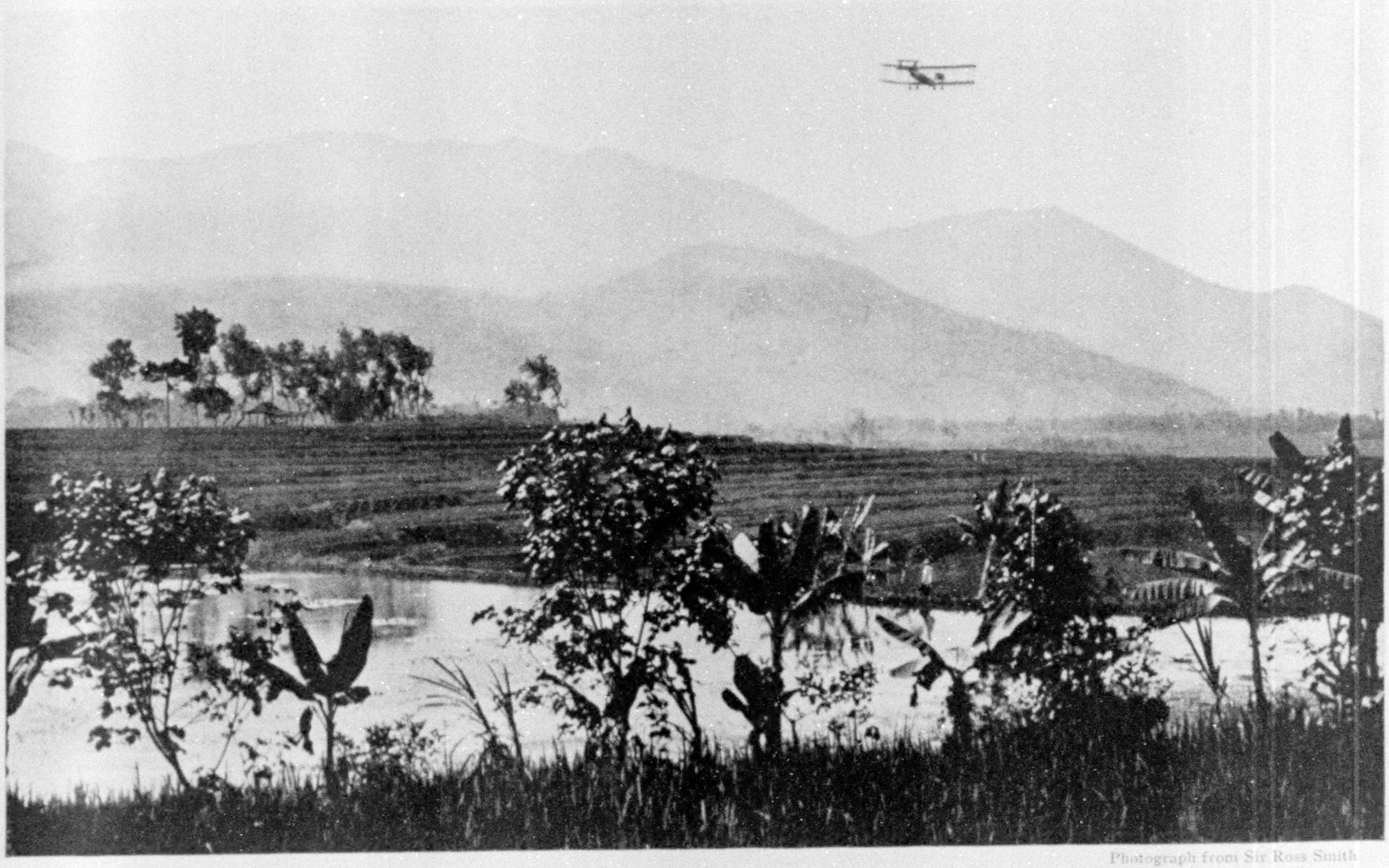

Photograph from Sir Ross Smith

FLYING ACROSS JAVA

"With beautiful weather favoring us, we sped rapidly over fertile tracts of this amazing island. Java impressed me as one vast bounteous garden, amid which rise the immense shapely cones of volcanic mountains" (see text, page 325).

France; but the weather was not so cold, so we felt physically more comfortable. The map showed the range to be about fifty miles wide, and after we had flown for half an hour, still another cloud barrier appeared directly ahead.

Our machine had now reached its "ceiling," so there was no alternative but to plunge ahead into the mist. We were then flying at an altitude of 11,000 feet, and were soon engulfed in a dense blanket of mist. As we had left England hurriedly, there had been no time to fit special cloud-navigating instruments, and the only ones we carried for this purpose were the ordinary compass, air-speed indicator, and inclinometer. Any one who has flown through clouds in a big machine, under similar circumstances, will appreciate my feelings at this time.

Down below us lay jagged mountain peaks buried by cloud. Ahead, around, and behind, the mist enfolded us in an impenetrable screen, and if I once allowed the machine to get beyond control, a horrible fate would be waiting for us all below.

WHAT FLYING IN CLOUDS MEANS

To those who have not experienced the anxiety of cloud-flying, I will attempt to describe briefly what happens.

The moment one plunges into heavy cloud there is misty blankness; all objects are lost to view; and as time wears on, a helpless feeling grows upon one that all sense of direction is lost. To overcome this predicament, I was provided with the aforementioned instruments, and settled down to try to watch all three at once and maintain their readings correct. In addition it was necessary to glance over the engine and the gauges continually.

At first all went well; but, while turning to check over an engine, I apparently and unconsciously, with the natural movement of my body, pushed one foot, which was on the rudder bar, slightly forward. This turned the machine off its course, and when next I looked at my compass I was ten degrees off course. I then kicked on the opposite rudder to bring the machine back; but, as the Vimy is much more sensitive to respond than the comparatively sluggish compass-needle, I found that I had put on too much rudder. The result was that when the compass-needle started to swing it did so through an angle of forty-five degrees.

In my attempt to correct the course and bring the needle back on to its correct reading, I glanced at the air-speed indicator and found it registering over one hundred miles an hour—twenty-five miles above normal flying speed. This meant that I must have pushed the nose of the machine down. The inclinometer indicated that the machine was not flying laterally correct; in fact, we were flying at an inclined angle of forty degrees.

I realized that the machine was slipping sideways, and that if I did not get matters righted at once, the machine would get out of control and go spinning down to earth.

LONG AND ANXIOUS MOMENTS

It is useless attempting to describe how I acted. A pilot does things instinctively, and presently my instruments told me that we were once more on our course and on an even keel.

All this took but a few seconds; but they were anxious moments, as a single mistake or the losing of one's head would have been fatal. This happened several times, and at the end of what seemed hours I glanced at my watch and found we had only been in the clouds for twelve minutes! Perhaps my nerves were a little ragged, owing to strain and lack of sleep during the past fortnight; but I felt at last that anything would be better than going on under these tense and nerve-racking conditions.

It was now an hour since we first started across the clouds, and both Keith and I concluded that we must surely be across the mountain range. So I decided to take the risk and go lower and "feel."

Shutting off both engines, we glided down, and I held up the machine so that we were going as slowly as possible—only about forty miles an hour.

The sensation was akin to the captain navigating a vessel in uncharted shoaling seas—expecting every moment to feel a bump. Lower and lower we went—ten, nine, eight thousand feet—and then we both anxiously peered over the sides—straining for a glimpse of hidden peaks.

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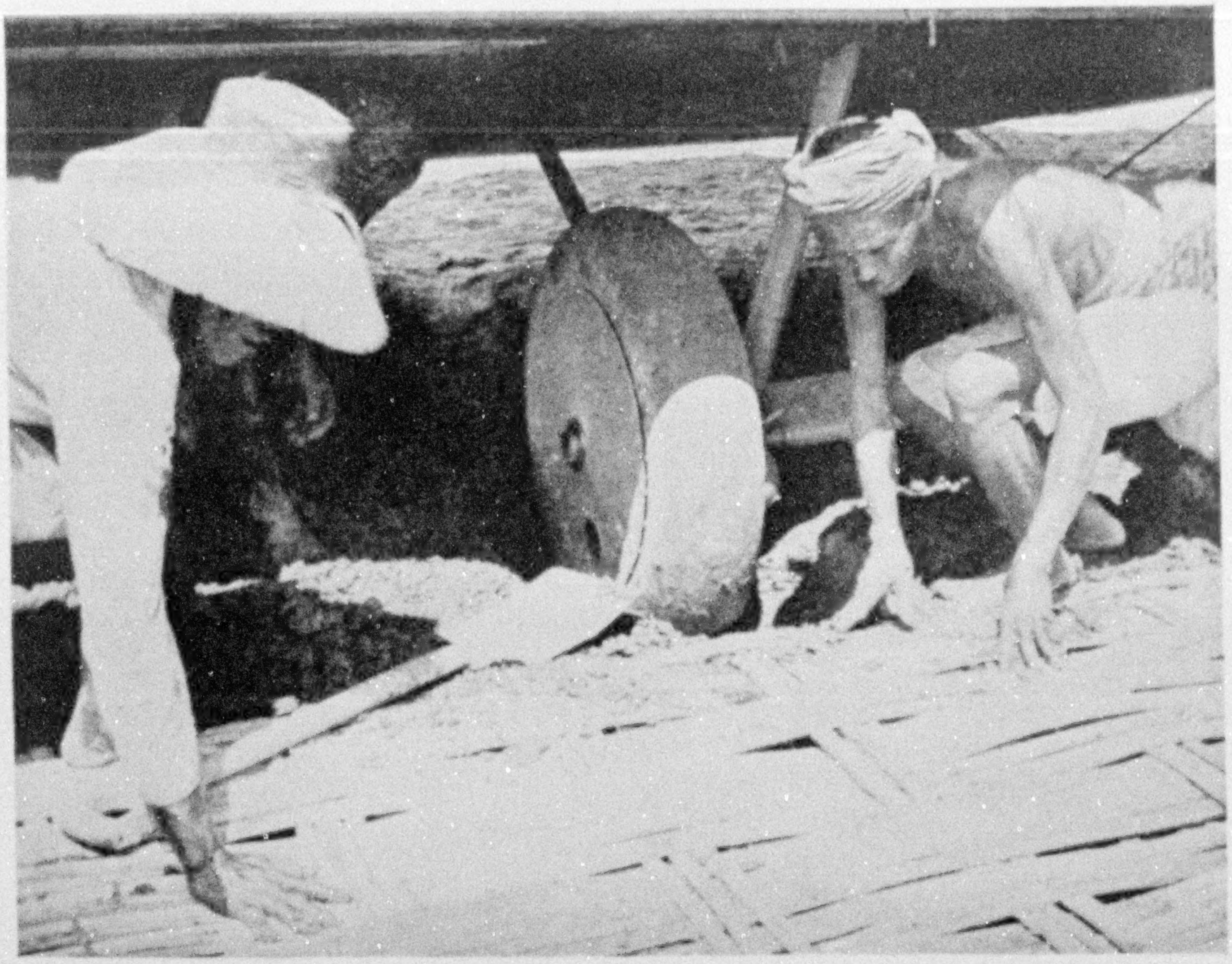


Photograph by Sir Ross Smith

NATIVES DIGGING THE WHEELS OF THE VIMY FROM THE MUD AT SOERABAYA, JAVA

The bamboo-matting runway, constructed to enable the Vimy to "take-off," was composed largely of the coverings of the native huts. Entire villages were stripped of their roofs to provide this material (see pages 316-317 and text, page 327).

As we approached the 7,000-foot level, which I knew to be the height of the range, we huddled together and held on tight, in anticipation of the crash! I noticed a small hole in the cloud, with something dark beneath. It was past in a flash, but instantly I pushed the throttle full open and flew level again. At first I thought it was the top of a dreadful peak, but on further consideration I remembered that in my brief glance the dark patch had looked a long way down.

A GLORIOUS WORLD BURSTS INTO VIEW

Once more I shut off and went lower, and as we had not hit anything by the time we reached 4,000 feet, I concluded that the range had been crossed.

A few minutes more and we burst out into full view of a glorious world, carpeted with trees, 1,500 feet below. The sudden transformation was stunning. It was an unspeakable relief—the end of an hour that was one of the veriest nightmare experiences I have ever passed through.

Before our bewildered gaze there stretched a dark-green forest, only limited by the distant skyline. Here and there the dark green was splashed with patches of bright-colored creeper, and in spite of the fact that there was not the vestige of a possible landing place, it was beautiful and a welcome relief. Later, the Siamese told us that all this country was unexplored.

The country now began to fall away gradually to the east; the hills became less rugged and petered out into undulating, yet heavily wooded, jungle. An hour later and we reached the Mekon River and the haunts of man. Small villages lay scattered along its banks and wide expanses of irrigated lands verdant with rice crops.

Following downstream, we landed at

Don Muang aërodrome, twelve miles north of Bangkok, after a flight that will live long in my memory. Don Muang is the headquarters of the Siamese Flying Corps. They have several hangars, a number of machines, and up-to-date workshops. During my visit to Siam the previous year I had been to Don Muang, so that on landing I found myself among friends. We were met by the British Consul General, Mr. T. H. Lyle, with whom I had stayed on my previous visit and who now rendered us valuable and appreciated assistance.

The Siamese also displayed the warmest hospitality, and the commandant very kindly placed his own bungalow at our disposal. It was found necessary to regrind the valves on two of the cylinders of the starboard engine; and, as this was a lengthy job, Bennett and Shiers worked all night to complete it, so that we might keep to our usual scheduled starting time. An electric lamp was rigged up over the engine, and all the flying ants and insects in Siam collected around it, which greatly added to the discomfort and hindrance of the work.

My original plan was to fly from Bangkok to Singapore, roughly 1,000 miles, in one flight; but as I learned there was a good aërodrome at Singora, about halfway, with 500 gallons of petrol depoted there, and as I was anxious to reserve the machine as much as possible, I decided to land at the latter place.

We left Bangkok in good weather, and were escorted for the first fifty miles by four Siamese machines. For the first hour the flying conditions were ideal, with a good following wind helping us; then ahead again lay our old enemies, the clouds. At this time we were flying along the coast, so did not deem it necessary to climb above them. The clouds became lower and heavier and soon we found ourselves only 1,000 feet above the sea.

CAUGHT IN A MONSOONAL STORM

Ahead we saw the rain, and I dreaded what was to come. While we were over the sea, with the land on our right, there was comparatively little chance of our crashing into anything. This was fortunate, for in a few moments we were soaked through, our goggles became saturated, and all vision for more than a few hundred yards or so was obliterated. The rain came down literally like a sheet of water, and, as we had to remove our goggles and maintain a constant lookout ahead, we were almost blinded by the rain lashing our unprotected eyes.

At this time we were doing ninety miles per hour, and as the torrential rain dashed against us and the machine it pattered and smote like hail. Narrowing my eyes down to slits, I peered out ahead as long as I could endure it: that was but a few minutes. I then tapped Keith to keep the watch while I rested my eyes; then, when he could see no more, I would "carry on" again. So it went on for the best part of three hours. Fortunately, this heavy rain was not continuous, but the squalls which we went through at frequent intervals generally took ten minutes to pass.

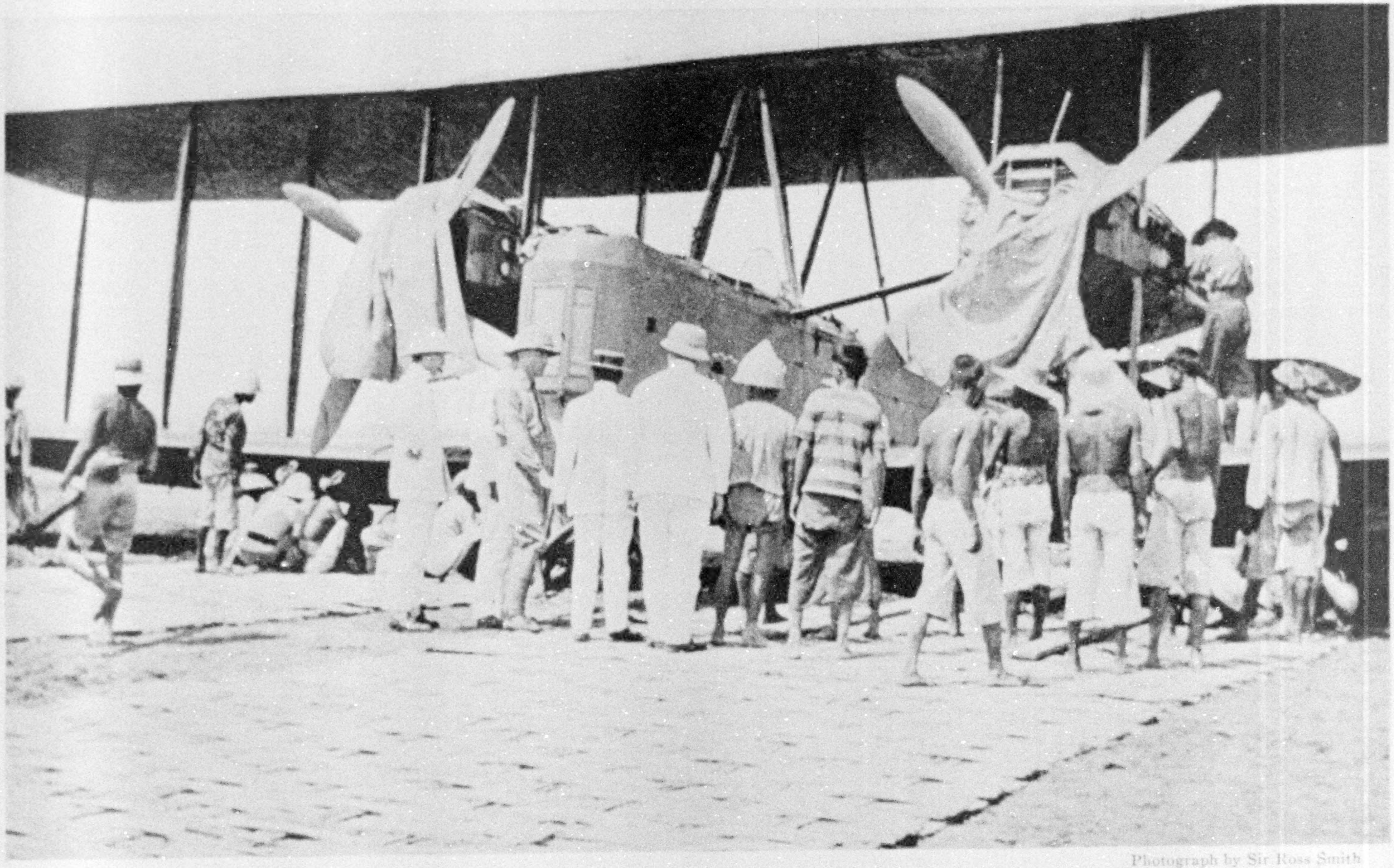
RACING THE STORM

Still another difficulty presented itself. As long as we were flying south, the strong wind helped us; but as we had to follow the coast-line in detail, and there were many bays and headlands, we frequently found ourselves fighting right into the teeth of the gale to get out of a bay or weather a headland.

I was afraid to go inland, as the rain only allowed us limited visibility. Once we almost crashed on to a hill, which suddenly loomed up through the rain ahead. I just had time by a hair's breadth to pull the machine around in a climbing turn and go farther out to sea. I have never experienced worse flying conditions, and had it been at all possible to land, I gladly would have done so.

All the flat stretches along the coast were paddy-fields under water. We were wet and miserable, and the thought oftentimes came over me of what an ignominious end it would be if we had engine trouble and were forced to land in a paddy-field of mud and water. I wondered at our marvelous engines—through the snows of France, the blaze of the tropics, and through these terrible rains, they still roared merrily on.

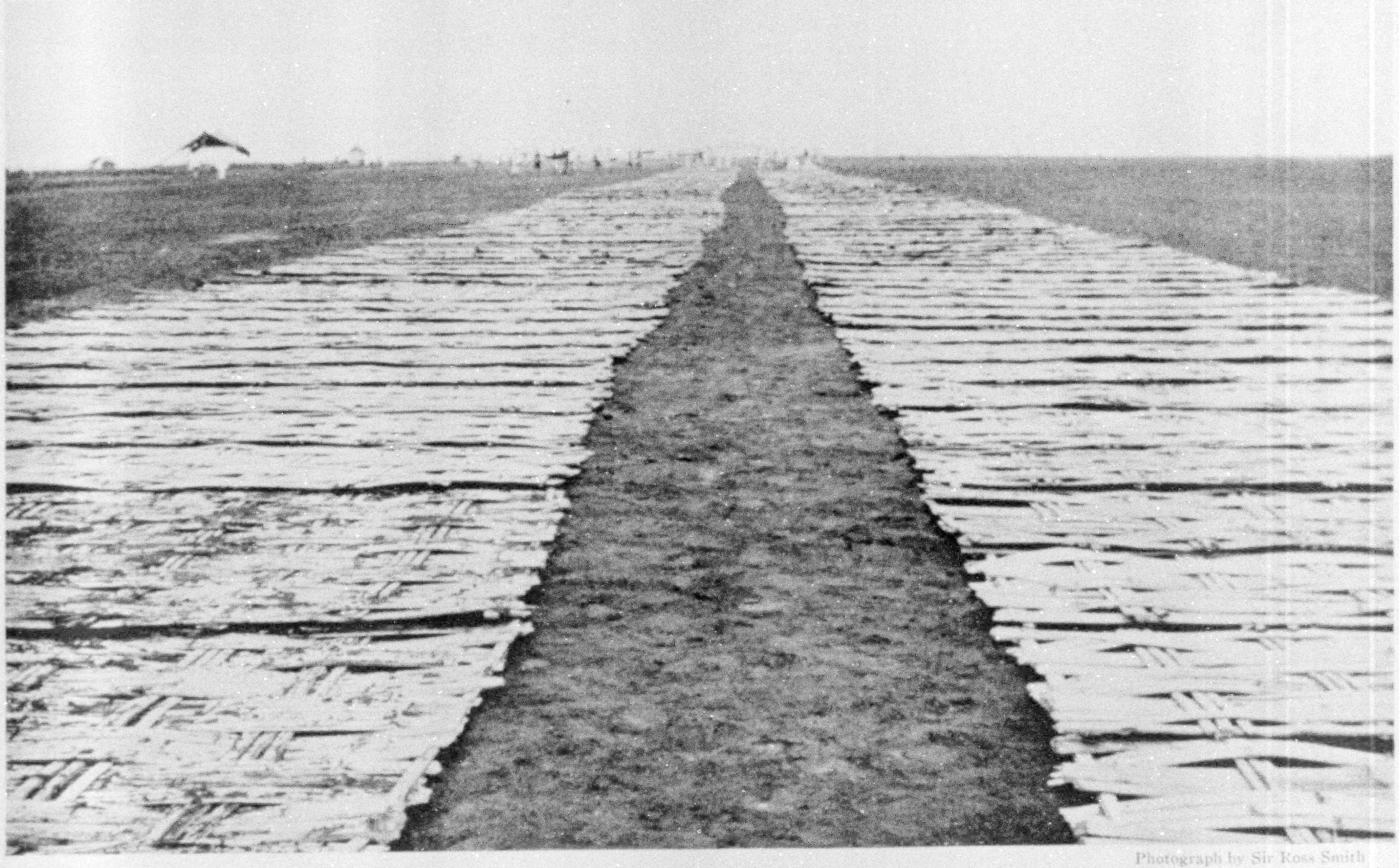
An hour before reaching Singora we passed through and outstripped the storm. As the clouds were still low, we kept our



Photograph by Sir Ross Smith

HAULING THE AËROPLANE ONTO THE BAMBOO TRACK: SOERABAYA, JAVA

At first the pathway of mats was merely laid on the ground. When the engines were started the "slip-stream" from the propellers whisked up the sheets and threw them into the tail-plane, causing the fabric to tear, a tire to puncture, and the machine to run once more into the bog (see text, page 328).



Photograph by Sir Ross Smith

PARALLEL BAMBOO ROADS CONSTRUCTED OF MATTING AS RUNWAYS FOR THE VIMY, AT THE AËRODROME IN SOERABAYA, JAVA

The necessity for the construction of this roadway grew out of the fact that the Vimy became bogged in the mud of the aërodrome. Two hundred coolies were required to haul the machine out of the mire (see text, page 327).

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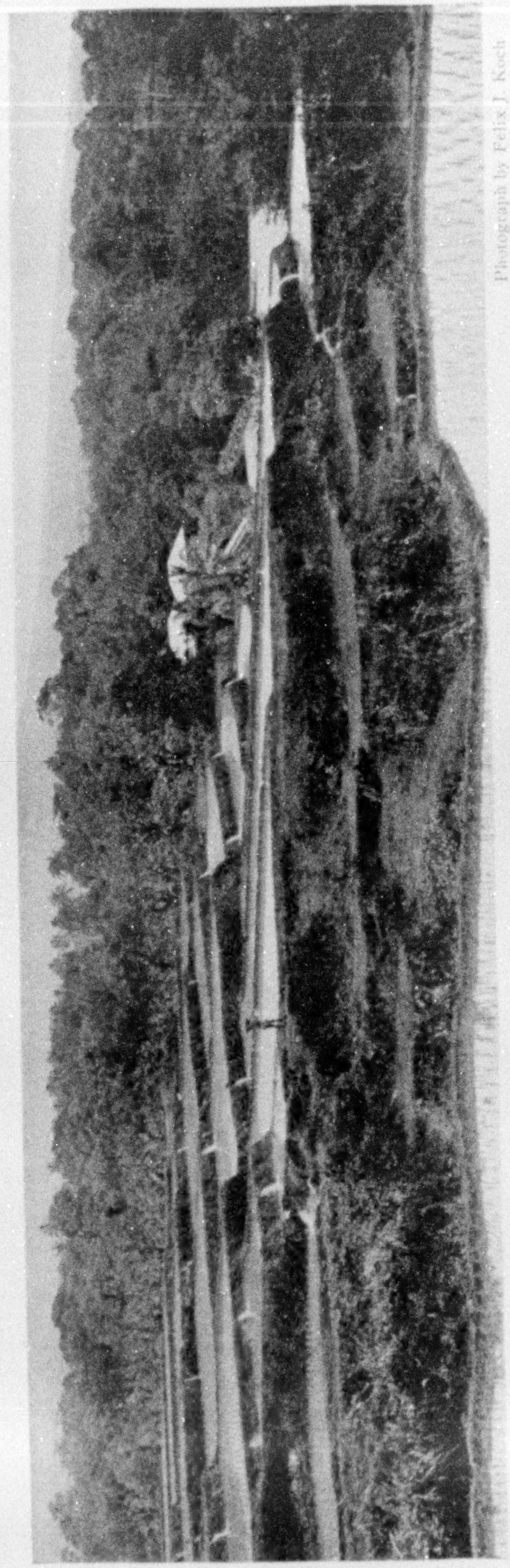

Photograph by Felix J. Koch

AMONG THE RICE-FIELDS OF THE DUTCH EAST INDIES (SEE TEXT, PAGE 325)

Viewed from the air, the "paddy" country resembles a series of miniature, cell-like squares that give the effect of a mighty grid, with native villages nestling here and there among palm groves and sugar plantations.

altitude down to 1,000 feet, passing here and there scattered villages, scaring the water buffaloes, which would career off, flashing across the paddy-fields as fast as their bulk would allow.

At last we reached Singora, and a glance at the aërodrome showed that at least half of it was under water. There was, however, a narrow strip along the center which appeared more or less dry, but I would have to make a landing across wind. I came down low to examine this strip, and to my utter dismay noticed that it was covered with small tree-stumps!

A wide and anxious circling around the aërodrome showed me there was no other spot on which to land; so there was nothing for it but to attempt to make a landing on this narrow strip of stump-studded ground.

As we touched and ran along, I expected every moment to feel a jolt and the under-carriage wrenched off, or else the machine thrown on to her nose; but by the merciful guidance of Providence we miraculously came to rest safely.

The only damage sustained was to our tail-skid, which had caught in a stump and been wrenched off. I walked back along our tracks and found that in several instances our wheels had missed by a few inches stumps a foot to eighteen inches high.

THE DEVIL IN THE MACHINE

The whole native population assembled to see us. None had ever seen an aëroplane before, and at first they would not venture near. Three Englishmen live at Singora, and one of them had imposed upon the simple native minds that the devil was going to arrive in a flying chariot to take charge over all the convicts there. When, however,

Photograph from Henry Ruschin

TEMPLE GROUNDS IN THE CAPITAL OF BALI, DUTCH EAST INDIES

The Vimy skirted the coast of Bali at an elevation of 2,000 feet. Bali is the first island to the east of Java.

they saw that four ordinary humans climbed out of the machine, they quickly surged around us. I noticed that they were staring, arguing, and pointing at us in a peculiar way; but it was not until I heard of our friend's joke that I understood the full significance of their interest in us.

Several of them walked in front of the machine, flapping their arms and performing birdlike evolutions. We concluded that they were solving the mystery of flight and demonstrating how the Vimy flapped its wings to rise from the ground. My brother, unobserved, climbed into the cockpit and, seizing the control column, vigorously moved it to and fro, which caused the ailerons* and elevators to flap about.

There was a wild scamper in all directions. We learned afterwards that the natives imagined that we were flapping our wings preparatory to starting off!

A PETROL SHORTAGE

My first inquiry was as to the quantity of petrol available. I discovered that the supposed 500 gallons was only 500 liters, depoted there for Poulet. This meant we would be compelled to remain here until I could get sufficient petrol from Penang or Bangkok to take us on to Singapore. I accordingly sent off an urgent wire to the Asiatic Petroleum Company at Penang, asking them to send me 200 gallons of aviation petrol as speedily as possible.

I also wired the resident councilor at Penang, asking him to assist, in the event of there being difficulty in getting this quantity of petrol shipped at such short notice. I next requested the Governor of Singora to have part of the aërodrome cleared of stumps to enable us to take off.

Our machine was left standing on the strip of high ground and we pegged her down securely for the night.

Our next contract was to mend the tail-skid. An examination showed that the fitting which attaches it to the fuselage had broken off. This meant at least six hours' work, provided we could find the

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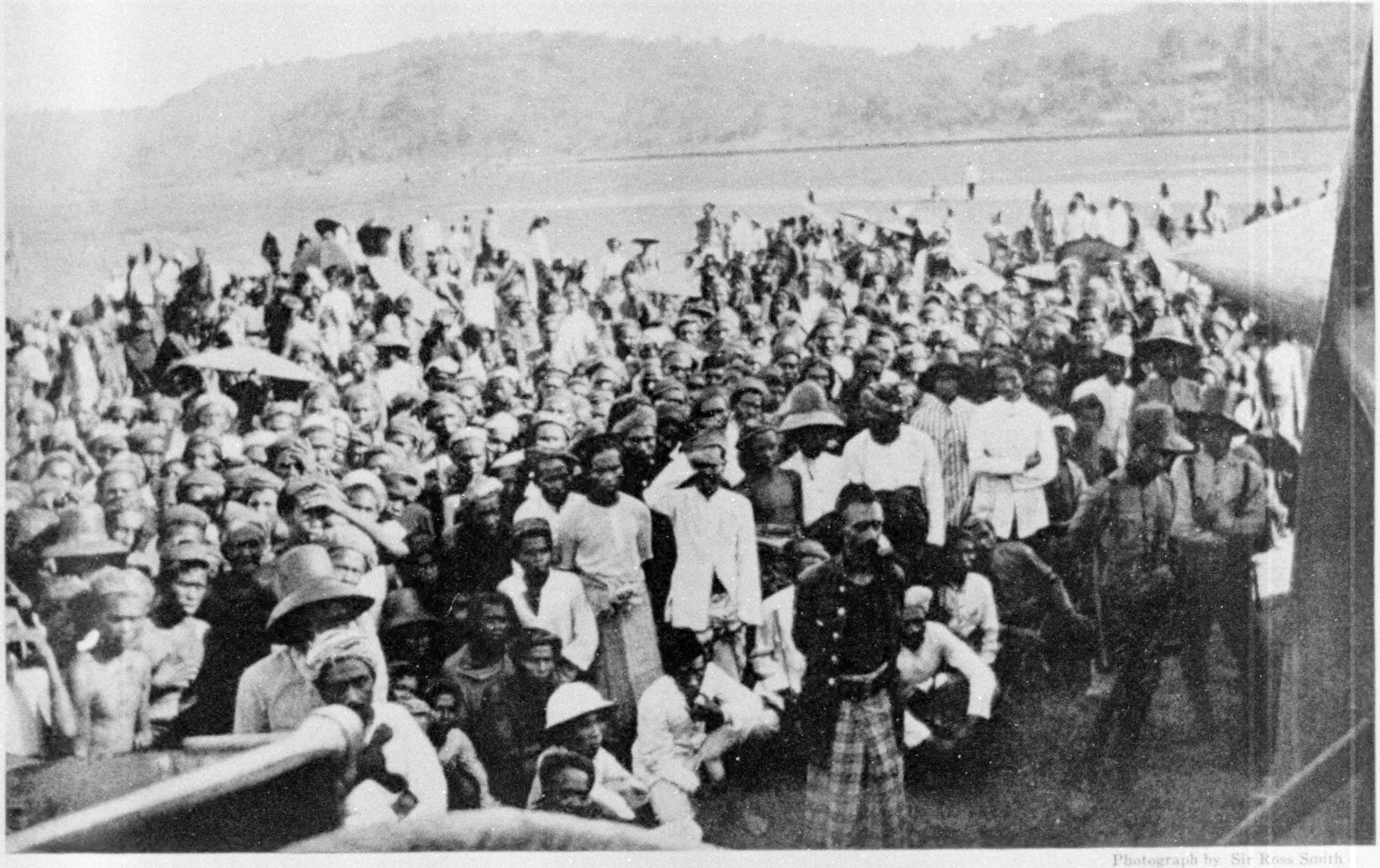
*Hinged portions on the ends of the wings used for banking when turning.



Photograph by Sir Ross Smith

THE BRITISH AIRMEN AROUSED INTENSE INTEREST AMONG THE NATIVES OF THE ISLAND OF SUMBAWA WHEN THE VIMY LANDED AT BIMA

The Sultan of Sumbawa and the leading Dutch official accorded the voyageurs every consideration, and the Bima aërodrome was in excellent condition, clearly marked with a white ring and encircled by a water-retaining wall (see text, page 329).

necessary materials. One of our English friends took us to a local Chinaman, a jack of all trades and the master of a promising heap of scrap-iron. Bennett unearthed a piece of steel shafting which, provided a lathe was available to turn it down to shape and size, fitted our purpose.

We then proceeded to a near-by rice mill which was just whistling off for the night. There we found a good lathe, but of primitive motive power. Four coolies turned a large pulley-wheel, and their power was transmitted by belt to the lathe.

Bennett got to work at once by the light of a kerosene lamp. After an hour's hard work, little impression was made on the steel, and our four-coolie-power engine "konked out."

Four more coolies were secured, but after half an hour they went on strike and demanded more money. I gave them the increase, but fifteen minutes later they went on strike again. This time we called the foreman from the rice mill. There was a different kind of strike, and so the work proceeded.

VI. How We Made Our Homing Flight

By 10 p. m. Bennett had completed the job, and, considering the makeshift tools, it was a remarkably fine piece of workmanship and skill.

Rain began to fall, so we returned to the bungalow which had been placed at our disposal by H. R. H. Prince Yugula.

Just before midnight we were awakened by the sound of a torrential downpour—the storm which we had passed through during the day had reached Singora. The wind increased to a gale, and, fearing that the machine might be in danger, we all turned out and kept watch. Fortunately, we had pegged her nose into the wind, but during the heavy squalls the Vimy so strained at her lashings that several times I feared she would be swept away and crushed.

We stood by all night, obtaining what little shelter we could from the wings, and at every squall rushed out and held on to the planes. Needless to say, we were drenched to the skin, and when the wind eased down, shortly after daybreak, we felt tired and miserable, with no dry clothes to put on.

Ten inches of rain had fallen during the night, and the whole of the aërodrome excepting the ridge on which the machine was standing resembled a lake. Luckily, the ground was sandy, and after the rain ceased the water drained off rapidly. Squalls continued throughout the day, but Bennett and Shiers, after rigging a tarpaulin shelter, were able to work on their engines.

After breakfast in the bungalow we returned to the machine and found that the government had sent down 200 convicts from the local jail to clear away the stumps; and so we set them to work to clear a strip about 400 yards long and fifty yards wide across the aërodrome.

The day's rest from flying was a delightful relaxation; in fact, an imperative necessity, for my brother's and my own eyes were almost too painful for vision, after the previous day's battling with the storm.

Late that afternoon our petrol arrived from Penang, but it was raining too heavily to risk putting it into the machine. We were greatly indebted to Captain Owen Hughes, an ex-Royal Air Force officer, for bringing up the petrol and also for his prompt attention in arranging for its transport.

A TRICKY TAKE-OFF

After a much-needed night's rest, we were down at the aërodrome at daylight, and after putting the 200 gallons of petrol into the tanks, started up the engines. Getting the machine into the air was a questionable problem, but, as our time for reaching Australia was fast closing in, we decided to make the attempt.

Three large patches of water extended across the aërodrome at intervals of about fifty yards. This water was, on the average, six inches deep; but, as the aërodrome was sandy, our wheels did not sink appreciably into it. A clear run of fifty yards allowed the machine to gather fair headway. Then she struck the water, which almost pulled us up; a race across another fifty yards of hard ground, and by the time we had passed through the second patch of water the machine was moving very little faster than at the beginning.

The third patch of ground was a little longer, and when we reached the third pool we were traveling at about thirty miles per hour.

The sudden impact with the water almost threw the Vimy on to her nose, and water was sucked up and whirled in every direction by the propellers. Our flying speed had to be gained on the seventy yards of dry ground which now remained; beyond that extended scrub and gorse bushes.

The Vimy bounded forward as soon as she left the water, and just managed to get sufficient lift on her wings to clear a ditch and scrape over the scrub.

I had been informed that the weather would be much better on the western coast of the peninsula, so we followed the railway line across to that side. As the clouds hung only a few hundred feet above the railroad, we were compelled to descend to a perilously low altitude, which was rendered the more hazardous by huge limestone outcrops, rising four to five hundred feet, scattered over the country.

A FASCINATING LAND

Along the western shores we found the weather much improved; the clouds were higher, and occasional bursts of sunshine threw weird light and shadow effects across the paddy-fields and scattered villages. We still maintained a low altitude, which added greatly to the interest of the flight and also gave us a splendid opportunity of studying intimately this remarkable and productive country.

Near Kaular Lumpar we entered the tin country and observed many tin dredges in full operation. Lower still we flew across the rubber plantations, cheered by the planters and waving back. Then, passing above Malacca, we reached Singapore in the afternoon, after one of the most interesting stages of the journey.

I had been dreading the landing and take-off at Singapore, as the improvised aërodrome, the race-course, was altogether too small for our large machine.

I glided the Vimy down at as low a speed as possible, and just before we touched the ground Bennett clambered out of the cockpit and slid along the top of the fuselage down to the tail-plane. His weight dropped the tail down quickly, with the result that the machine pulled up in about one hundred yards after touching the ground.

The next day, December 4, was my birthday, and to reach Australia within the specified thirty-day time limit meant that we had to arrive in Darwin on the 12th, eight days from now, and four more landings to make after leaving Singapore. Thus it will be seen we still had four days in hand. I therefore decided to remain the whole of next day at Singapore and work on our machine.

AN "EARLY" DANCE

We now had, roughly, 2,500 miles to complete, and in all that distance I knew of only five places at which a landing could be made; the rest of the country was either mountain, jungle, or swamp; so it behooved us to look well to our machine, for a single engine trouble and a forced landing away from any of these aërodromes would have ended all.

The heat at Singapore was intense and, coming from the cold of the English winter, we felt it severely. After a heavy day on the machine, we were asked that night to a dance at the Tanglin Club, but physical weariness compelled us to refuse.

My host, in a very persuasive manner, did his utmost to induce me to go, assuring me the dance would be over very early. However, when we arrived at our machine, at daylight next morning, and were getting ready to start off, my quondam host of the night before and some of his party arrived, all still wearing evening dress. They had just come from the early dance!

As I have mentioned previously, the ground was much too small for an aërodrome, and the heavy rain which had fallen overnight made it very heavy.

My brother and I paced over and examined the ground and discussed the best way to take off, but we were both very dubious as to whether we could get the machine into the air or would pile her up on the adjacent houses in the attempt. I taxied into the position, so as

Photograph from Sir Ross Smith

"WE DRANK SUCCESS TO THE LAST STAGE OF THE FLIGHT IN THE VINTAGE OF TIMOR—COCONUT MILK"

The aërodrome on the island of Timor, the last landing place before reaching Australia, had been completed by the Dutch officials the day before the arrival of the Vimy (see p. 335).

to give the maximum amount of run, and then opened the throttle full out.

We gathered way slowly, and I watched the fence around the course come rapidly nearer and nearer, and still we were not off the ground. It was a tense and anxious moment. When fifty yards from the rails, I pulled my control-lever back; the trusty Vimy rose to the occasion and just cleared the rails. There were still houses and trees to be negotiated, and I set the Vimy climbing at an alarmingly steep angle.

Another breathless moment passed, and the wheels of the under-carriage just brushed the tree-tops. It was a great triumph for the Vimy. She achieved the seemingly impossible, and to this day I regard our escape from disaster during this perilous take-off as providential and one of the finest maneuvers of the whole voyage.

HEADING FOR JAVA

After a wide sweep above Singapore, we headed for the open sea and Java.

Photograph by Sir Ross Smith

AN AUSTRALIAN WARSHIP PATROLLING THE SEAS BETWEEN TIMOR AND PORT DARWIN

"A faint smoke haze resolved into the smoke-plume of a fighting ship—the *Sydney*—and we knew that, whatever might befall, we had a friend at hand." It was the *Sydney* which sank the famous German commerce raider, *Emden* (see page 335).

Passing down to the Sumatran coast, we ran into characteristic doldrum weather—isolated patches of dark thunder-storm clouds, from which the rain teemed down in heavy, murky columns.

Occasional forks of lightning seared the clouds, throwing up into relief their immense bulk and shedding a flickering gleam over the calm sea, where almost stagnation expanded. Occasionally a light zephyr came out of the east, but almost in the course of a few minutes the puff had boxed the compass and died away.

BUMPING OVER "THE LINE"

The spectacle of these local storms was extremely uncanny, and by navigating accordingly it was easy to avoid them. On reaching the coast of Sumatra we encountered a light head wind and flying conditions became very bumpy. One immense vacuum into which we fell made us hold tight and wonder.

XUM

"That's the Equator," ejaculated my brother, and, sure enough, by dead reckoning, we had bumped across the line into the Southern Hemisphere.

Our entrance into the Southern Hemisphere was welcomed by improved weather, but the landscape below—dense jungle inland, fringed along the seashore by belts of mangrove swamps and the blue tropical sea—often kindled in my mind thoughts of utter helplessness in case of engine trouble.

There developed in me a strange admiration—almost reverence—for the super-mechanism that hummed away rhythmically, that had now covered 10,000 miles without an overhaul, and at the opposite side of the globe was still singing a hymn of praise to the makers, as it had done when the bleak wintry snows had carpeted the aërodrome at Hounslow and northern France. How far away this all seemed!

These were times, indeed, for musing, as we sped along above this tranquil tropical landscape, home only a few days away—an achievement!

Numerous small islets—emeralds in a setting of turquoise—passed below us. There were yearnings to land and explore their mangrove-fringed bays and foreshores, but the nearest landing was our destination, Batavia.

Soon the large island of Muntok came below, and in the strait separating the mainland we passed a vessel. Subsequently we learned she was equipped with wireless and had transmitted news of our arrival on to Batavia.

I had originally intended to hug the coast of Sumatra on to Java; but as it was all dense mangrove swamp, with no sign of a possible landing-place, I reasoned that we might just as well fly over the sea. My brother computed the compass course, and so we headed direct for Batavia.

THE LANDING AT KALEDJAT

The hazy contours of the mountains marking the western end of Java soon began to show up to starboard, and ahead a scene of rare enchantment began to resolve itself upon the bosom of the tropical sea.

The sea was a glorious mirror almost as rippleless as the canopy above, and scattered broadcast lay a thousand isles, each one beautiful, and all combined to make one of the most beautiful sights I have ever looked down upon. Many of the islands are heavily grown with palms extending to the very water's edge; others, sparsely cultivated, fringed with a narrow ribbon of beach; but around each is a setting of an exquisite shade of green, marking a sand-girt shallow; then deep-blue and depth.

Myriads of tiny white fisher-sails passed through the channels, gleaning their harvest from the sea.

Reluctantly we turned from this glimpse of fairy-land, and, bearing for the Garden Island of the East, soon reached Batavia, the city of canals and beautiful avenues.

Following the railway line, we landed at the Dutch Flying School at Kaledjat. The Dutch had sent an escort of four machines to welcome us; but, although they passed within about 500 feet of the Vimy, they missed us.

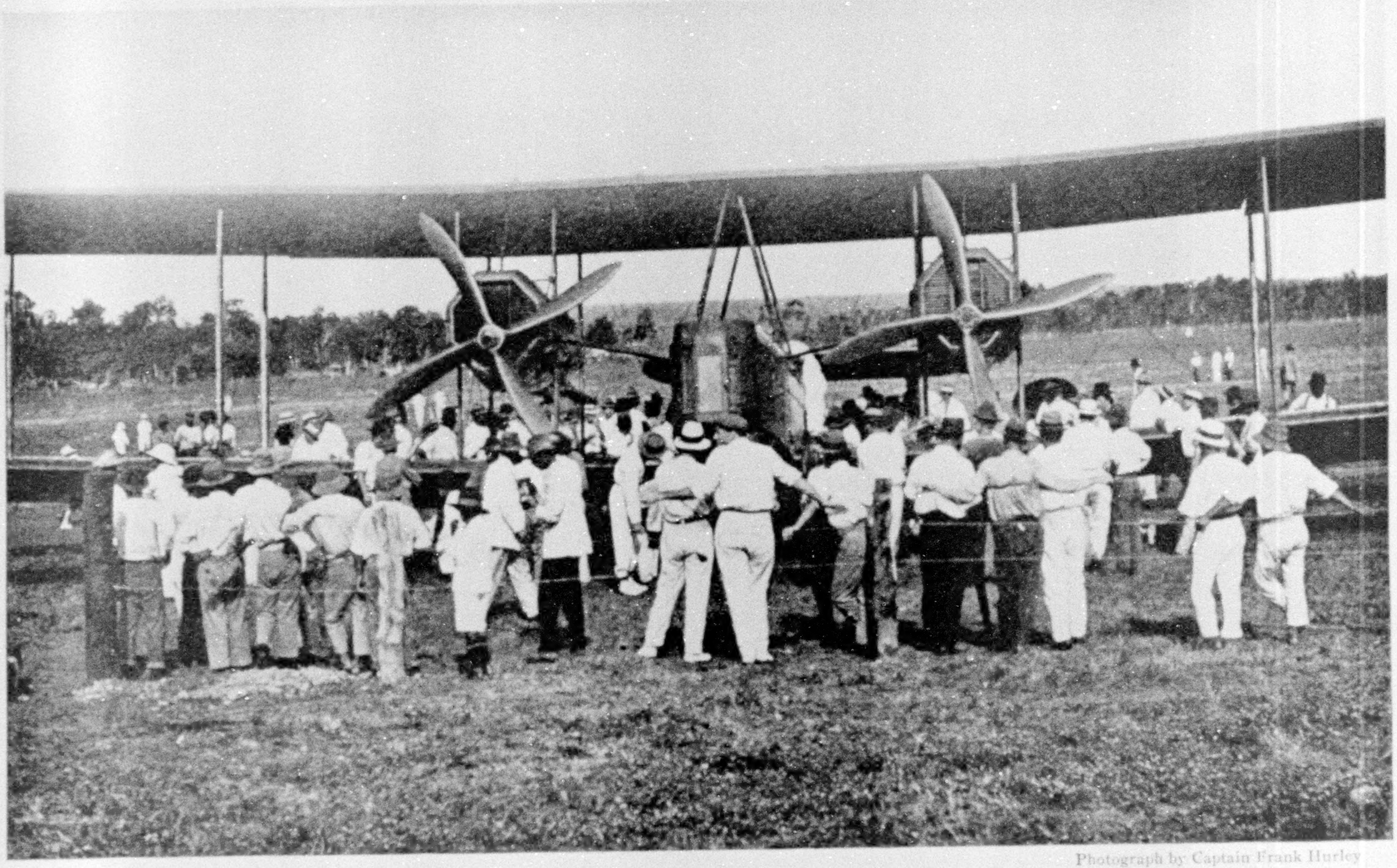
The distance of 650 miles from Singapore we had covered in just nine hours. Hearty greeting was extended to us by His Excellency Count Van Limburg Stirum, the Governor-General of the Netherlands Indies, and a large number of leading officials.

After a well-enjoyed meal, we set to work on the machine. The petrol available was very heavy, and it took us eight hours to filter 350 gallons through the chamois leather strainer into the tanks. As the next stage to Soerabaya was only a short lap, we did not leave Kaledjat before 7.30.

THE BOUNTEOUS GARDEN OF JAVA

With beautiful weather favoring us, we sped rapidly over fertile tracts of this amazing island, charmed by the unsurpassable beauty that unfolded below. Java impressed me as one vast bounteous garden, amid which rise the immense, shapely cones of volcanic mountains.

Perhaps one of the most striking sights was the "paddy" country. From our height, the whole expanse of the land appeared to be inundated by irrigation water—all contained in miniature, cell-like squares, that gave the effect of a mighty grid, stretching away to the moun-



Photograph by Captain Frank Hurley

THE CROWD AT PORT DARWIN INSPECTING THE VIMY AFTER THE COMPLETION OF ITS HISTORIC FLIGHT HALF WAY AROUND THE WORLD

Through every possible rigor the Vimy had come, and not once, from the time of its departure from Hounslow, near London, had it been under shelter.

tains on our right. Even there the irrigation did not cease, but climbed up the mountain sides in a system of stairlike terraces.

Here and there native villages nestled beneath the shelter of the palm groves or among the verdant green of sugar plantations. Always in the background, subdued by tropic haze, rose the chain of peaks, practically all quiescent, and far away to the left that faint blue line which marked the Pacific horizon.

Nearing Soerabaya, flying became very bumpy, and it was no small relief when the town, like a magic carpet of multicolored fabric, spread beneath us. Heading the Vimy down, we made a low circle above the town, to the infinite amazement of the teeming native population that swarmed out into the streets, petrified, evidently, by the visitation.

As the aërodrome was small, I decided to land on the north side, so that, if we overshot its length, I could, perhaps, swing round to the left. This maneuver, however, I discovered to be unnecessary. We made a good landing and were easing off to rest when the machine seemed to drag, and from past experience I knew at once the Vimy was becoming bogged.

IN THE MUD

Opening up the starboard engine, we began to swing slowly, but the port wheels immediately sank into the mud and we tilted on to our fore-skid. At once I shut off both engines and the Vimy gradually eased back to her normal position.

The natives and people, who had been kept back by the Dutch soldiers, rushed the ground, and their weight on the sun-dried crust soon broke it up, and mud began to ooze through. In a very short while the Vimy subsided to her axles and was surrounded by a pond of semi-liquid mud.

The proposition literally was a decidedly sticky one. It was midday, broiling hot, and the tenacity of the mud reminded me forcibly of that clinging tendency familiar to our black-soil plains. Moreover, only four days of our prescribed time remained in which we must make Port Darwin.

The engineer of the Harbor Board arrived, and together we discussed the situation. He collected a horde of coolies and a large quantity of bamboo matting, and so we set to work to dig out the wheels.

After some hard work we got the matting almost under the wheels, started up the engine, and, aided by the coolies and Dutch soldiers, the Vimy was hauled from the bog. I then stopped the engines, tied ropes to the under-carriage, and the machine was pulled on to a pathway of mats (see page 316).

After a couple of hours the machine was safe out of the morass, and the ground on which we stood felt quite solid; so I thought we had landed on the only soft spot on the aërodrome, and decided to taxi to the opposite end under our own engine-power.

I was soon disillusioned, for, after moving but ten yards, down went the wheels again. More digging, tugging, and pushing, and we, apprehensive all the while as to whether the coolies would drag off the under-carriage, finally had to lay down a pathway of bamboo mats and have the machine hauled by 200 coolie-power.

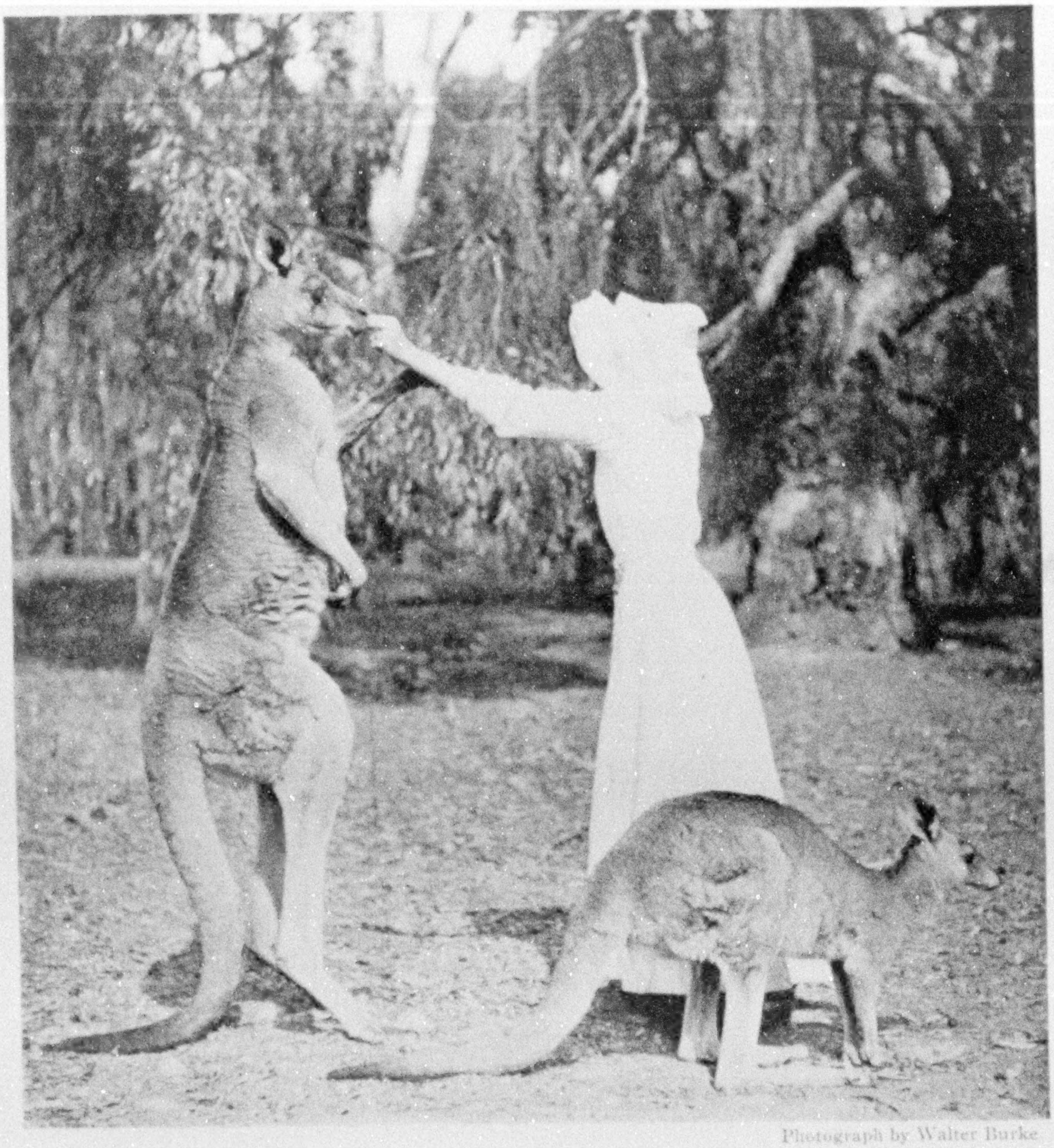
I should say here that our hearty thanks are due to the harbor engineer and the officials—indeed, to all who lent a hand—for without them it would have been impossible for us to have completed the flight on the scheduled time.

MAKING A RUNWAY OF NATIVE ROOFS

My brother and I had decided that it would be impossible to get the Vimy into the air in the usual way, so we consulted with our invaluable friend, the engineer, and he agreed to collect bamboo matting from far and wide, so that we might construct a mat-paved roadway.

I observed that this matting formed the principal covering of the native huts, and subsequently learned that entire villages in the immediate vicinity were stripped bare to provide us with the necessary materials.

The British consul invited us to a "quiet" dinner that evening, but when we arrived at the café every British resident in Soerabaya had gathered there to welcome us.



Photograph by Walter Burke

GAWKY PETS IN AUSTRALIA

On the left is an "old man" kangaroo, standing nearly seven feet high when in action. The claws on his hind legs are so powerful that he can rip open an attacking dog with one stroke. The animal on the ground is a female of the species. During their enforced stay in a dried-up swamp one night, the aviators' camp was visited by several of these animals.

Next morning saw us at the aërodrome by daylight, and a gladsome sight met our eyes. Natives were streaming in from every direction bearing sheets of bamboo matting—they were literally carrying their houses on their backs—and already a great pile of it lay by the Vimy (see pages 314-317).

At first a pathway of mats was merely laid down, but in our keen anxiety to get off we had overlooked the "slip-stream" from the propellers. The engines were opened up and we were just gathering speed nicely when some of the sheets were whisked up and blown into the tail-plane. The fabric was torn, a tire punctured, and the Vimy ran off and bogged badly.

Once more we had to extricate the wheels and reconstruct the roadway. This time we pegged down and interlaced the mats.

More matting arrived on a motor-lory, so we lengthened the road, said a second

© Photograph by F. Birtles

WHITE-ANT BEDS OF NORTHERN TERRITORY, AUSTRALIA

When a split propeller blade necessitated a forced landing in northern Australia, some of these large ant-hills provided the material for an improvised roadway to enable the Vimy to "take-off" after repairs had been made.

good-bye, and, just twenty-four hours after our arrival at Soerabaya, made a sensational take-off, with the mats flying in all directions. We circled low over the town and anchorage, so as to give the engines time to settle down to normal running, and then we headed on a direct compass course for Bima.

From the point of view of a prospective forced landing, the 400-mile flight to Bima was impossible. Not a single flat occurred on which we might have landed. Scenically, this lap was glorious. We skirted the coast of Bali and Lombok, keeping only 2,000 feet above the sea.

The Bima aërodrome we found in excellent condition, clearly marked with a white ring and encircled by a water-retaining wall. The natives scampered in all directions and would not venture near until they saw us walking about the machine.

The local sultan and the Dutch officer met us and proffered the hospitality of a native bungalow a couple of miles from the machine. Here we aroused intense interest; eyes taking little furtive glimpses at us peered through every crack and gap.

During that night some gentleman tried to force my window. I waited quietly until he had raised the sash halfway; then a shot from my Very light pistol put him to a screaming and, I have no doubt, a terror-stricken flight.

The natives had recovered from their shyness by next morning, and on our arrival were swarming around the machine with presents of coconuts sufficient to start a plantation; evidently they thought the Vimy a very thirsty sort of bird.

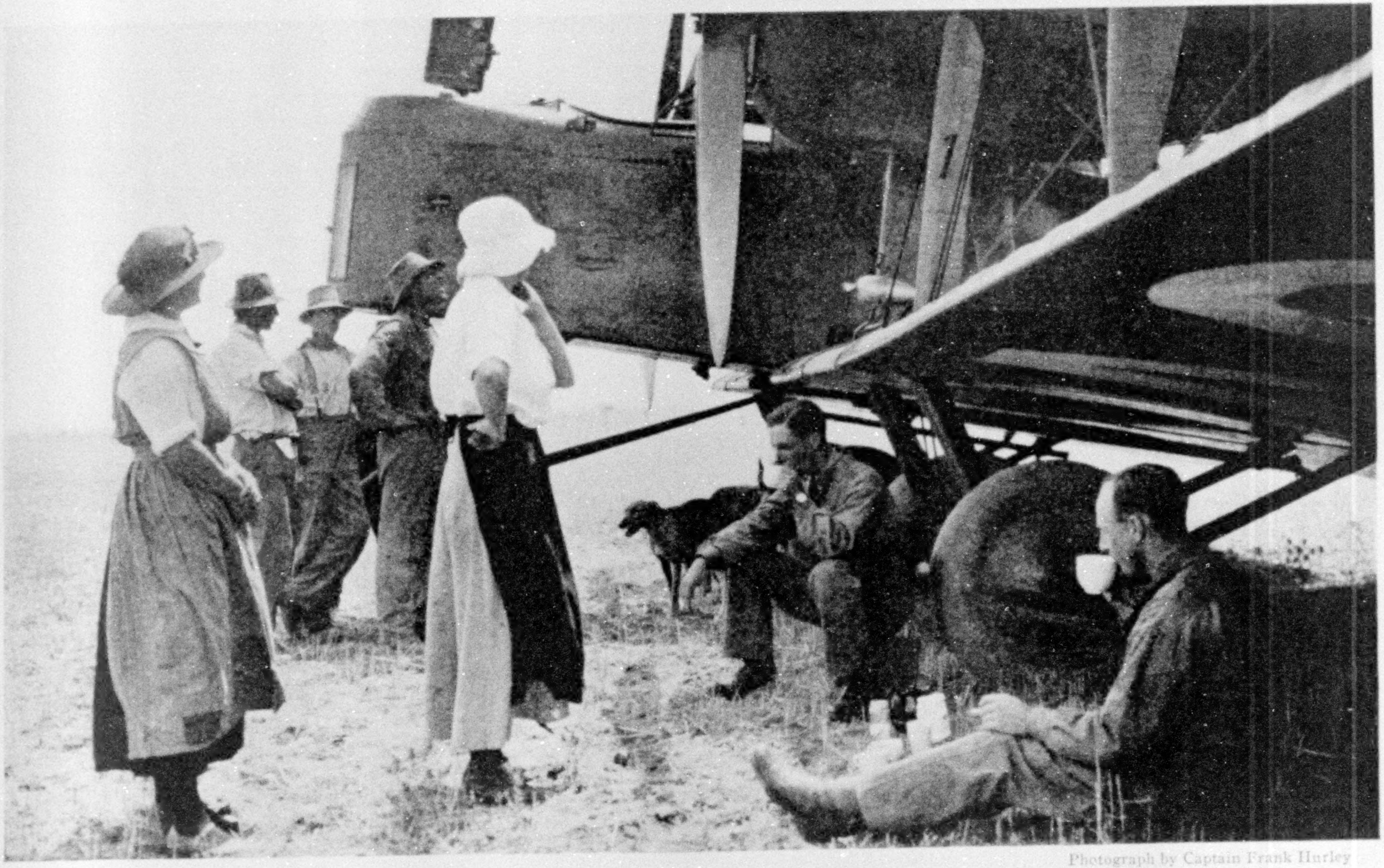
We took a cargo of nuts on board, as the water was unsuited for drinking, and, setting off in dazzling sunshine, once more pursued our course above scenes of tropical enchantment and alluring charm.

AT TIMOR

After following the north coast of Flores to Reo, we crossed over to the south side of the island and ran into isolated rainstorms.

We observed a volcano in active eruption on the eastern horizon, but, as the weather indicated a change for the worse, we could not afford to make a deviation. We flew on as far as Pandar, and then swung off direct for Timor.

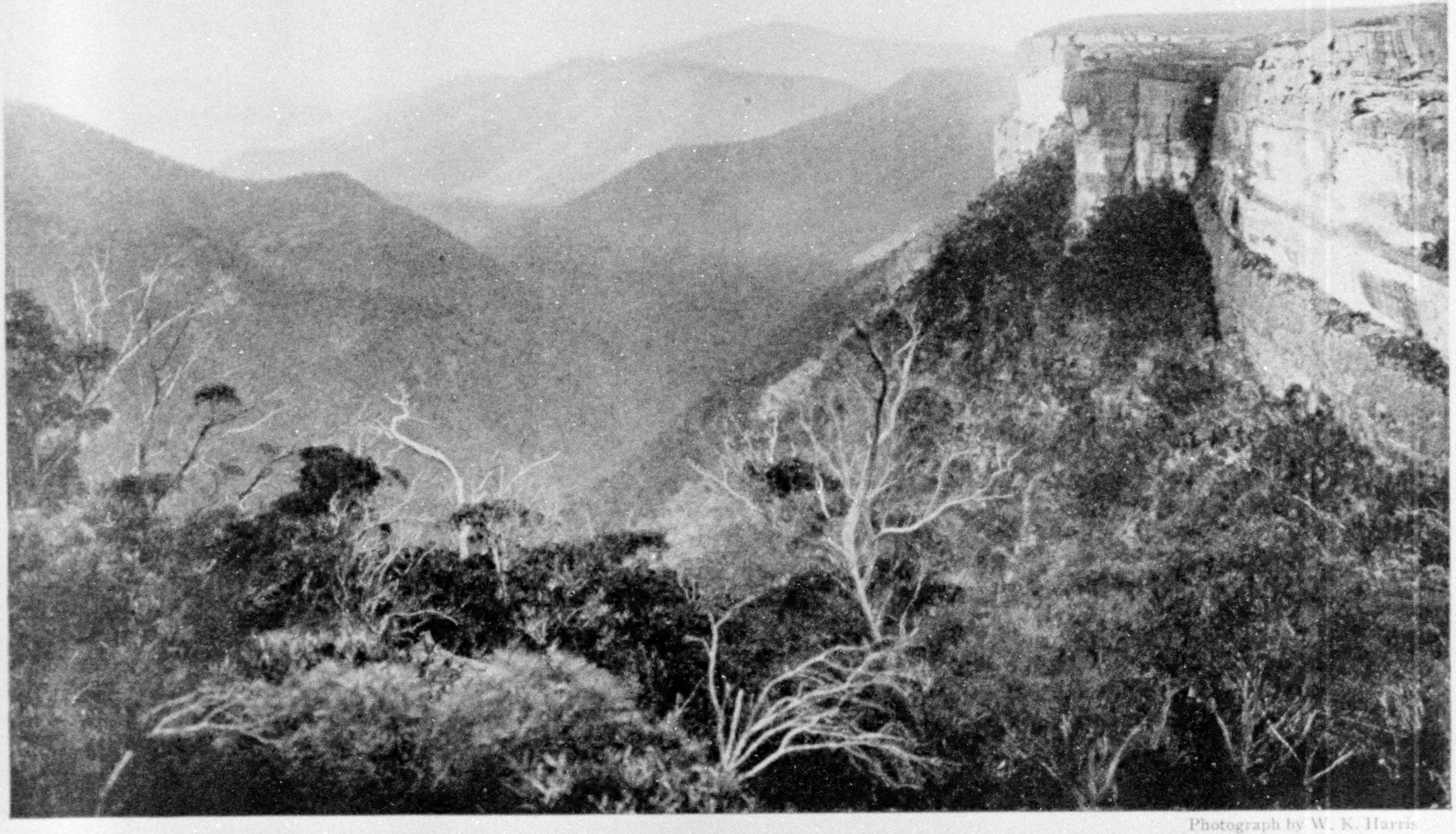
XUM



Photograph by Captain Frank Hurley

ENJOYING MORNING TEA IN AUSTRALIA

Even in the smallest hamlets the aviators were always the center of an eager group of spectators, as the Vimy continued its triumphal flight

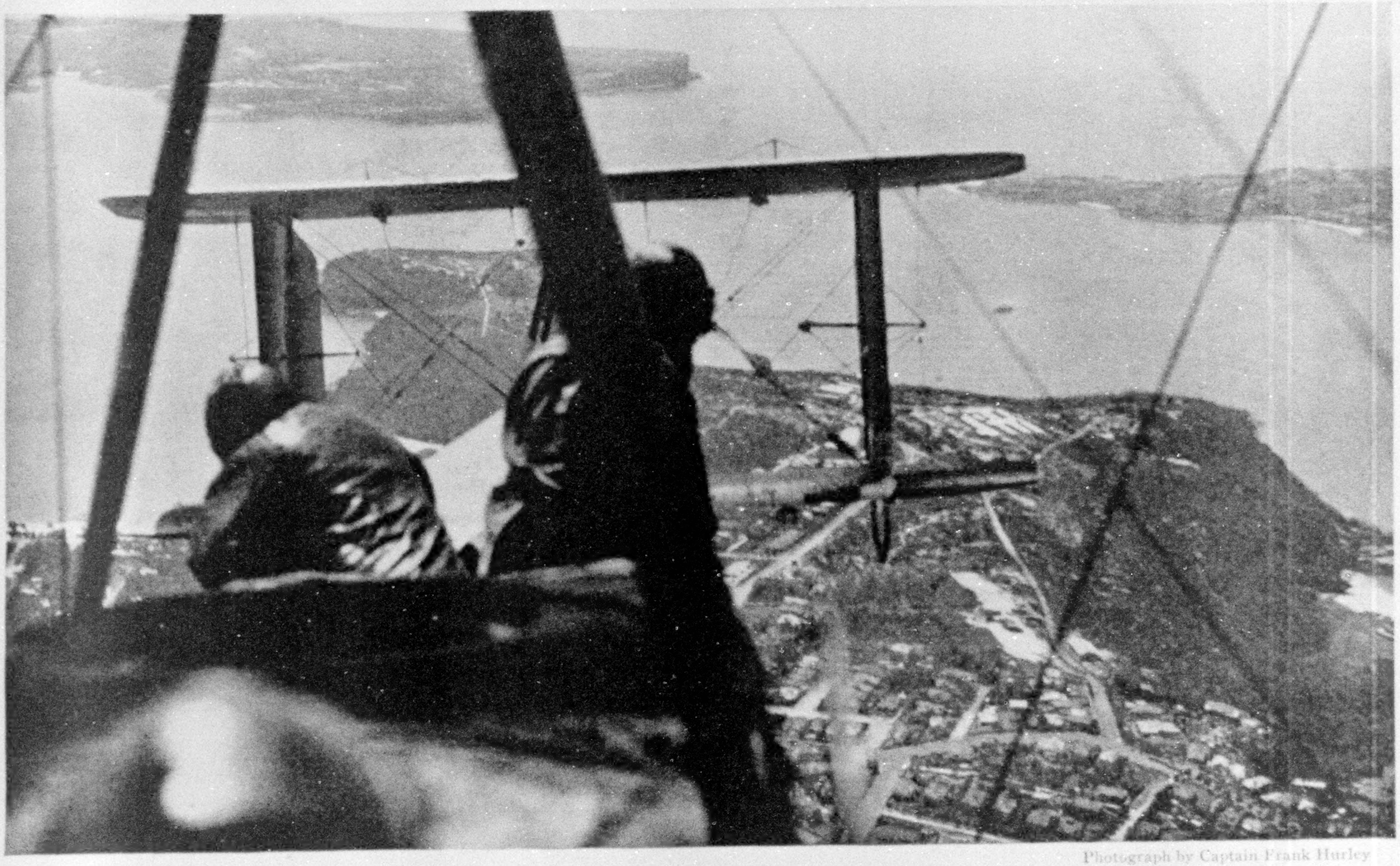


Photograph by W. K. Harris

THE GREAT GORGE OF THE BLUE MOUNTAINS, NEW SOUTH WALES, AUSTRALIA (SEE PAGE 337)

On the voyage across Australia Sir Ross Smith was accompanied by Captain Frank Hurley, the Antarctic explorer and war photographer, who was commissioned to illustrate this leg of the journey.

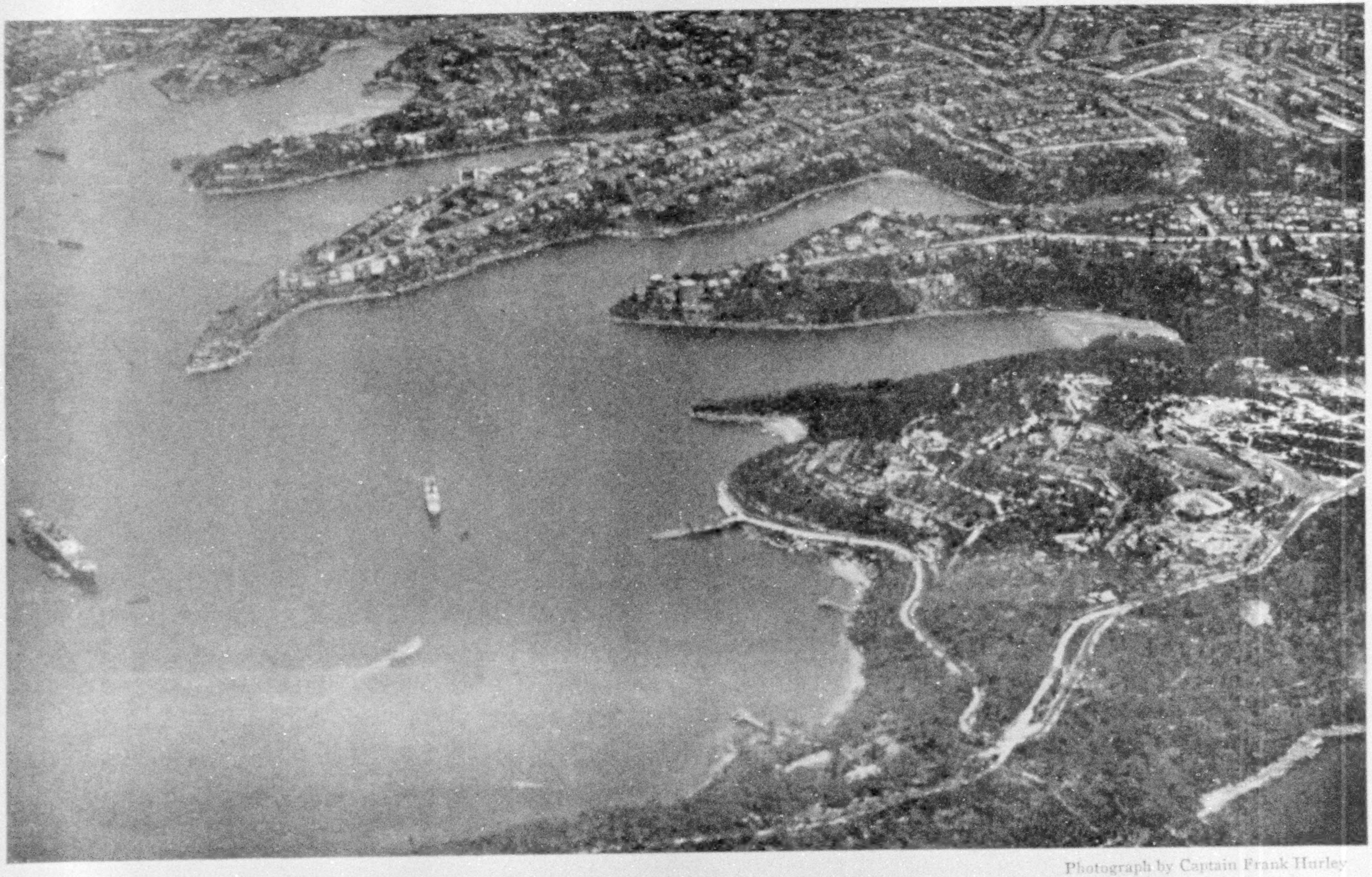
XUM



Photograph by Captain Frank Hurley

SIR ROSS SMITH ARRIVES IN AUSTRALIA'S FAMOUS SEAPORT OF SYDNEY

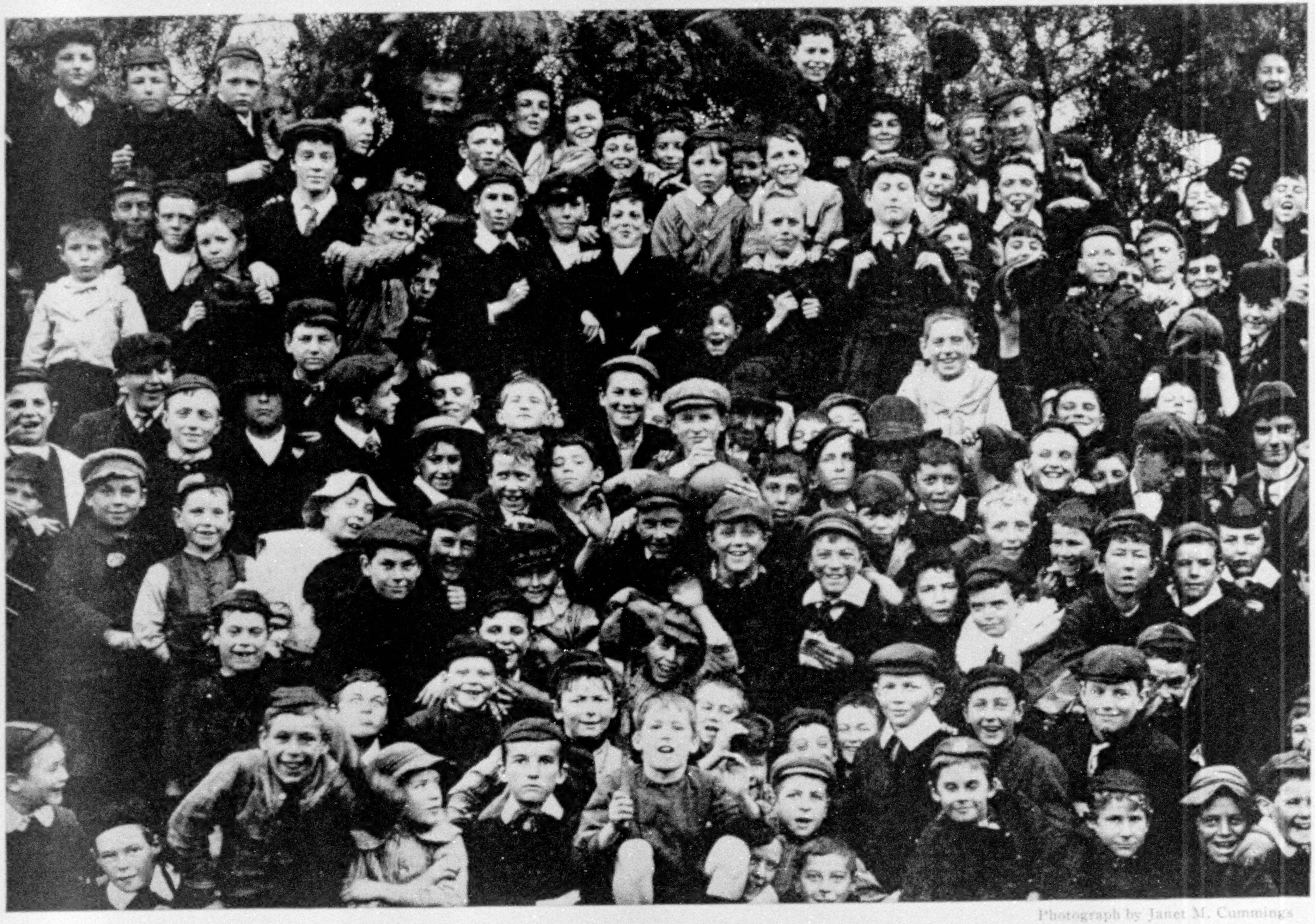
A tumultuous welcome awaited the aviators upon their arrival in the capital city of New South Wales.



Photograph by Captain Frank Hurley

SYDNEY AND ITS WONDERFUL HARBOR AS SEEN FROM THE AIR

"Like a mighty fern leaf, ramified and studded with islets, this glorious waterway unfolded below. The city and its environs, massed along the waterfront and extending into the hinterlands, flanked by the Blue Mountains, composed a spectacle of exquisite charm and beauty (see text, page 337).



Photograph by Janet M. Cummings

STUDIES IN EXPRESSION WHEN YOUNG AUSTRALIA IS INTERESTED

We had by this time acquired such confidence in our engines that it mattered little what lay below us—sea or land.

The thick volcanic smoke soon obscured the land and all distant vision, but we eventually picked up the Timor coast a few hundred yards from our calculated position. Ten miles inland we came down on the aërodrome at Atamboea, our last landing ground before Port Darwin.

The Dutch officials, who welcomed us, had thoughtfully arranged our petrol and oil supply close at hand, saving us a good deal of valuable time, which we were able to devote to a thorough overhaul.

THE NIGHT BEFORE THE FINAL "TAKE OFF"

Tomorrow would be the great day whereupon reposed the destiny of our hopes, labors, and ideals.

This was one of the aërodromes specially made by the Governor-General of the Netherlands Indies for the Australian flight, and had been completed only the day before our arrival. A guard of Dutch soldiers kept watch over the machine while we proceeded with their officers to camp, some six miles away.

It is hardly necessary to say that none of us overslept. We were too excited at the prospect of the morrow. We felt sure that if it dawned fine and hot, our homing was assured; but as we stepped out, before sunrise, into the still, sluggish air, we realized that our hopes of an early start were small. A heavy haze lay over the sea and the coast, obscuring everything; so we decided to await its clearing.

We were at the aërodrome before sunup to discover that a great swarm of natives were even earlier risers than ourselves. Most had come afoot, but many had ridden their ponies, and they clustered on and around the fence, behind and beside the Vimy, like swarming bees. We had hauled the machine well back and raised the tail over the fence in order to take advantage of every foot of the short run.

ONE OF OUR CLOSEST SHAVES

Our start off was brightened by one of those incidents that usually make material for comic papers. The propellers were just "kicking" over, like two great fans, and those natives sitting on the fence in the line of the slip-stream were enjoying the cool breeze and looking pleased with themselves. When I opened up the engines and both propellers swung into action, the sudden blast of air sent these particular spectators toppling back into the crowd, where ponies and natives made a glorious mixup, at which we all laughed heartily.

Soon after 8 the fog began to thin, and by 8.35, to be exact, I opened up the engines and just managed to scrape out of the 'drome. Scrape is exactly the word, for the branch-tops of the gum-tree rasped along the bottom of the machine as we rose. It was indeed one of the closest shaves of the trip.

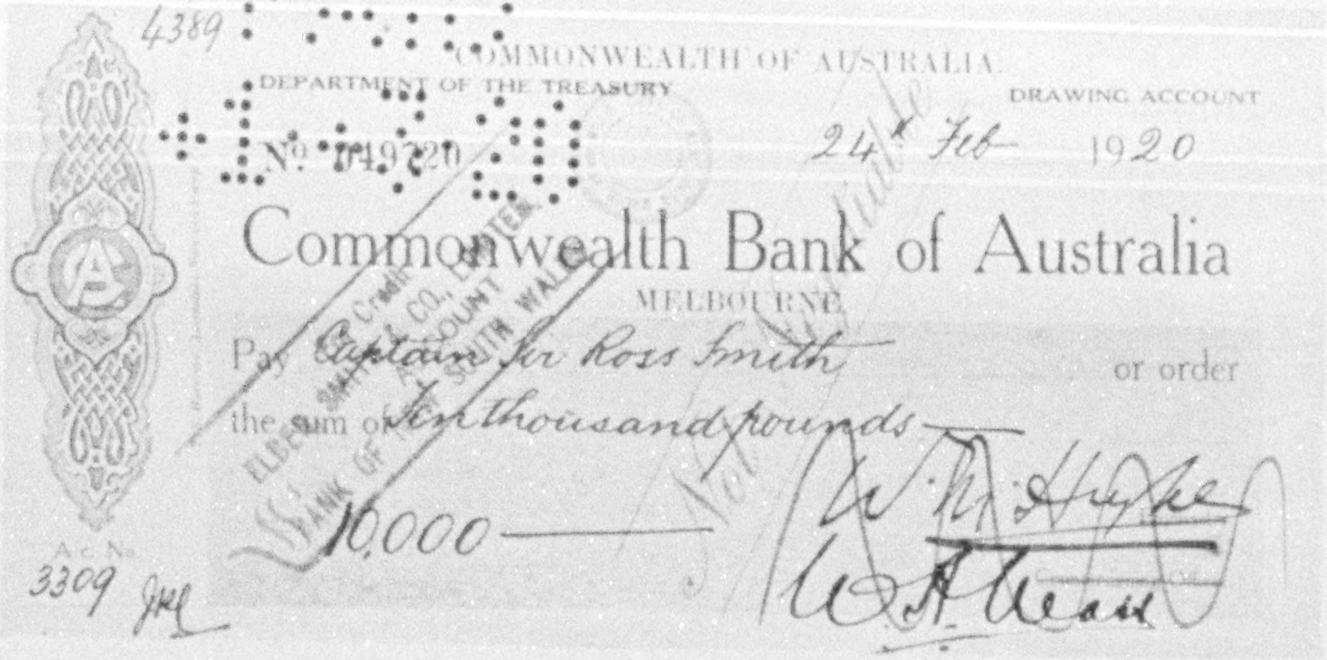
In front of us rose a chain of high hills, and, as the atmosphere was hot and we climbed very slowly, we made a detour to avoid them. Still flying low, we approached the coast and pulled ourselves together for the final lap—the jump across the sheet of blue Indian Ocean that lay between us and Port Darwin.

Keith took all possible bearings, noted wind direction, and made numerous calculations of ground speeds. Then we set compass course for Darwin, and with a "Here goes!" we were out over the sea. All our hearts were beating a little quicker; even our fine old engines seemed to throb a trifle faster.

SIGHTING THE "SYDNEY"

Our watches registered 11.48 when Keith nodded ahead, and, dead on the line of our flight, we made out a faint smoke haze that soon resolved itself into the smoke-plume of a fighting-ship. It was the *Sydney*, and we knew now that, whatever might befall, we had a friend at hand.

We swooped low, and exactly at twelve minutes past noon passed over the vessel, seeing plainly the upturned faces of the sailors and their waving hands. It was a cheer of welcome quite different from anything that we had experienced on the long journey. Perhaps it is not to be wondered at that the result of our snapshot was blurred through the shaking of the camera (see page 324).



4389

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF THE TREASURY

DRAWING ACCOUNT

Nº 049720

24th Feb 1920

Commonwealth Bank of Australia

MELBOURNE

Pay Captain Sir Ross Smith or order

the sum of Ten thousand pounds

£10,000

W. M. Hughes

W. A. Watt

A/c No. 3309 JHL

ELDER SMITH & CO. LIMITED Credit ACCOUNT BANK OF NEW SOUTH WALES

Photograph by Captain Frank Hurley

THE £10,000 PRIZE PRESENTED BY THE COMMONWEALTH OF AUSTRALIA TO SIR ROSS SMITH FOR THE FIRST LONDON-TO-AUSTRALIA AIR VOYAGE

The commander of the expedition decided that, as all four voyageurs had participated equally in the perils and the labors of the enterprise, they should all share alike in its financial rewards. Each man received a fourth of the prize money.

We took the opportunity of snatching a speed test, and found that we were averaging seventy-five miles an hour.

THE FIRST GLIMPSE OF HOME

An hour later both of us saw ahead and to port what appeared to be haze, but which we hoped was land, though neither dared express his hopes. They were justified, however, ten minutes later, and hailing Bennett and Shiers, we pointed joyfully to Bathurst Island lighthouse.

It was just 2.6 p. m. when, as our diary prosaically notes, we "observed Australia." At three o'clock we not only observed it, but rested firmly upon it, for, having circled over Darwin and come low enough to observe the crowds and the landing-place, we settled on Terra Australis on December 10th, 27 days 20 hours after taking off from Hounslow.

Two zealous customs and health officials were anxious to examine us, but so were about 2,000 just ordinary citizens, and the odds of 1,000 to 1 were rather long for those departmental men, and our welcome was not delayed.

The hardships and perils of the past month were forgotten in the excitement of the present. We shook hands with one another, our hearts swelling with those emotions invoked by achievement and the glamour of the moment. It was, and will be, perhaps, the supreme hour of our lives.

Almost reverently we looked over the Vimy, and unspoken admiration crept over us as we paid a silent tribute to those in far-off England for their sterling and honest craftsmanship. The successful issue of the venture, in a great degree, was due to them, and surely they merited and deserved a large proportion of the praise.

Through every possible climatic rigor the Vimy had passed, and practically without any attention. Not once, from the time we took our departure from Hounslow, had she ever been under shelter. And now, as I looked over her, aglow with pride, the Vimy loomed up as the zenith of man's inventive and constructional genius. I could find neither fault nor flaw in the construction, and, given a few days overhaul on the engines, the Vimy would have been quite capable of turning round and flying back to England.

OUR WELCOME HOME

These reflections were of brief duration, for the crowd, having satisfied its curiosity over the machine, directed it to us. The Administrator of the Northern Territory and the Mayor of Darwin were given barely time to make an official welcome when the assemblage, brimming with enthusiasm, lifted us shoulder high and conveyed us to the *jail!*

This sinister objective, for the moment, gave us qualms, for we fully expected a charge of exceeding the speed limit to be preferred against us. That drastic apprehension resolved itself into being dumped on a tree-stump, historic or otherwise, in the garden, while raucous howls of "Speech! Speech!" came from the hospitable multitude.

After the exchange of much hot air on both sides, we returned to the Vimy, made all snug, and lashed her down for the night.

OVERWHELMED WITH TELEGRAMS

During our stay at Darwin we were the guests of Mr. Staniford Smith, at Government House. And now we were to be bewildered by an amazing array of cables and telegrams. They arrived in great fifteen-minute shoals from every corner of the globe.

What had gone wrong? Surely every one had gone mad—or had we? Why all this fuss and excitement? In our race across the globe we had not read a newspaper, and, beyond the local natural attention evinced at our numerous landing-grounds, we knew nothing of the interest the rest of the world was taking in the flight.

Great indeed was our astonishment when, on turning up back files of newspapers, we read of our exploits, recorded with a degree of detail that must have taxed the imaginative resources of editorial staffs to gray hairs.

The rush, strain, and anxiety were over; henceforward the conclusion of our flight across Australia could be undertaken leisurely; and, what was more to the point, we could afford to wait for the best possible flying conditions.

Much of the flight over featureless wastes would have been drear and monotonous, but it was Australia and that was compensation enough. Moreover, we had the occasional diversion of passing over the small out-back towns, where many of the inhabitants rushed into the streets and stood looking up, waving and cheering.

The sublimest spectacle of the entire flight from Hounslow to our journey's end was to burst upon us when we arrived over Sydney and its wonderful harbor.

Like a mighty fern-leaf, ramifying and studded with islets, this glorious waterway unfolded below. The city and its environs, massed along the waterfront and extending into the hinterlands, flanked by the Blue Mountains, compose a spectacle of exquisite charm and beauty.*

We headed up the coast and, turning through the entrance, entered the port.

Planing down to 600 feet, we flew above a myriad ferry-boats and vessels, from the whistles of which little white jets of steam spurted up, screaming a welcome; then across the roof-tops, where crowded waving and cheering humanity, and over the streets below, where little specks paused to look up and join in the greeting. It was a great day—a time that comes once in a lifetime.

THE PRIZE IS DIVIDED EQUALLY

Not the least pleasant incident upon our arrival finally in Melbourne was the paying over of the £10,000 prize by the Prime Minister, the Right Hon. W. M. Hughes, on behalf of the Commonwealth Government. As all participated equally in the perils and labors of the enterprise, the prize was divided into four equal shares.

In Melbourne I formally handed the Vimy over to the Commonwealth Government on behalf of Messrs. Vickers Ltd., who generously presented the machine to the Commonwealth as an historic relic of the first aërial flight from London to Australia. At the request of the authorities, I flew the machine on to Adelaide, my native city, and thus realized to the full my ambition and dream of flying from London to my own home.

It would be hard indeed to comprehend the feelings that surged through me as I landed the Vimy on the sod of my native city—the recognition of familiar faces; the greeting of well-known voices; the

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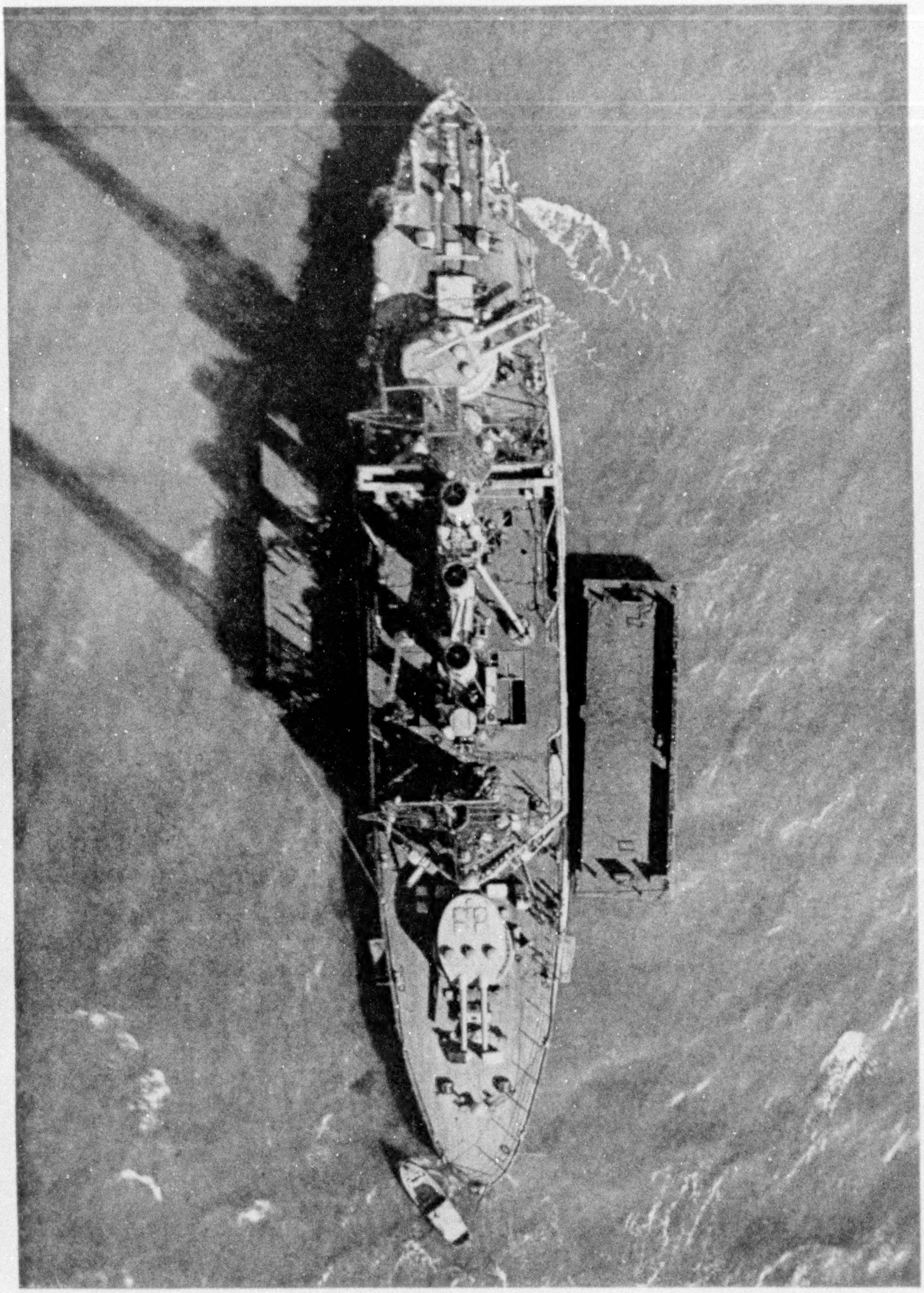
* See "Lonely Australia, the Unique Continent," by Herbert E. Gregory, in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1916.



Photograph by U. S. Army Air Service

LOOKING DOWN ON THE DECKS OF THE U. S. BATTLESHIP "OHIO" FROM AN AIRPLANE

A single air bomb containing from 1,000 to 1,400 pounds of high explosive and dropped from an airplane would wreak more destruction on this great floating fortress than 25 large projectiles from an enemy battleship (see text, page 341).

XUM

hand-clasp of innumerable friends; but, greatest of all, the reunion with my parents after five long years.

Our heartfelt thanks are due to the officers and mechanics of the Royal Air Force; to the Dutch authorities for constructing aërodromes and other assistance, and for the coöperation of numerous friends, whose willing and generous help laid the paving-stones over which Fortune piloted me.

My brother Keith shares equally any worthiness that the effort might merit, as also do my two master mechanics, Sergeants Bennett and Shiers, whose loyalty and devotion to duty have done much to bind closer the outposts of the Empire through the trails of the skies.

AMERICA IN THE AIR

The Future of Airplane and Airship, Economically and as Factors in National Defense

By Brigadier-General William Mitchell

Assistant Chief of Air Service, Formerly Commanding Aviation, First Corps, First Army, and Group of Armies, A. E. F.

THE flying-machine, dreamed of for centuries, became a reality with the development of the gasoline engine. Before that all sorts of appliances had been tried, ending with an actual flying-machine, developed by Professor Langley, of the Smithsonian Institution.

A steam-engine furnished the motive power for Langley's creation, and it actually flew alone, but it did not succeed in carrying a man to and from an airdrome until a gasoline engine was fitted to it years after Langley's death.

Although the Wright Brothers had experimented for several years, their first public demonstrations took place in 1908. So, really, the practical application of aviation has been within the last twelve years.

Similarly, lighter-than-air craft—that is, dirigible balloons, or "airships," as we call them today—had been experimented with for a long time, but they also had to wait for the gasoline engine as a propelling force.

Much as we would like to see the greatest application of aëronautics to civil and commercial uses, this will come gradually and not at once. It took many years for the railways to supplant the stage-coach and for the motor cars to do away with the horse-drawn vehicles.

At present over 90 per cent of all aëronautical appliances are used exclusively as elements of national defense by the countries owning them.

An airplane* is one of the most complicated instruments in all its parts, and changes more rapidly as the knowledge of its properties expands than any other creation which has been known heretofore.

THE AIRPLANE AS A FIGHTING MACHINE INTRODUCED IN WORLD WAR

Up to the time of the World War, all military power was exerted either on the land or on the water, and offensive and defensive equipment was made so as to withstand attack in a single dimension. With the coming of the fighting airplane all of these notions had to be modified, and a third element, acting both over the ground and over the sea, considering no frontiers such as rivers or mountains, deserts or coast-lines, and whose only limit was the amount of fuel in its tanks, had to be considered.

Slow as the old services, both army and navy, were to recognize the power of this new arm, it was forced upon them to such

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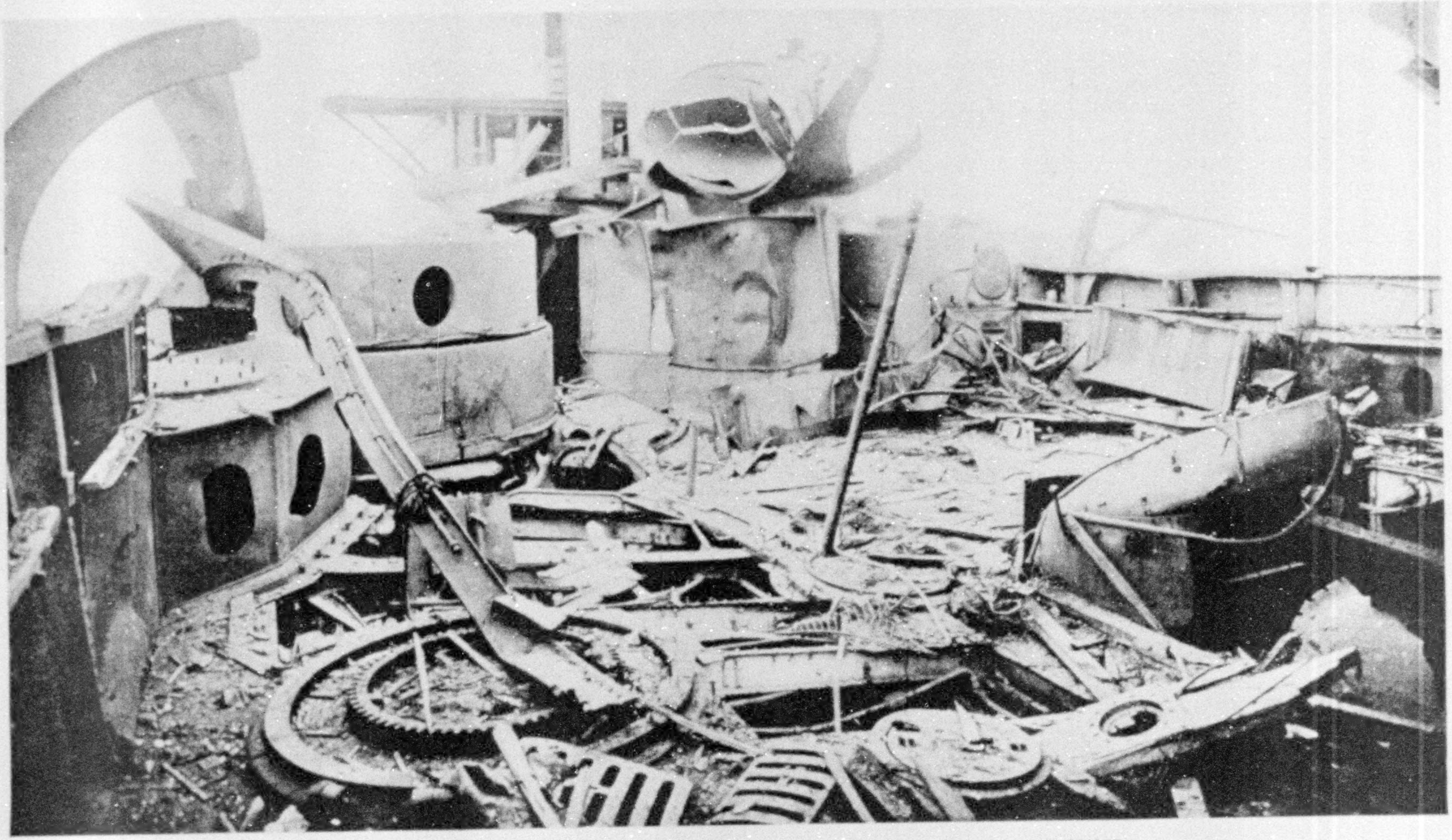
* In the preceding article Sir Ross Smith's use of the British form *aëroplane* has been retained, but *airplane* is the official name for a flying machine in the United States—Editor.



EFFECT OF AN AËRIAL BOMB DETONATED ON THE DECK OF A BATTLESHIP

It will be noticed that the turret is cracked and demolished; the whole deck is swept clean, and several decks down below smashed; the deck above blown off. The damage extended to practically all parts of the U. S. S. *Indiana*, whose days of usefulness as a fighting craft were over, and on which the tests were made.

A direct hit by an aërial bomb on a battleship will break every electric light globe on the ship and throw her into absolute darkness below-decks; will disrupt telephone, radio, and interior communication systems; fill with noxious gases the fire-rooms, engine-rooms, and all compartments ventilated by force draft; cause shell-shock to the personnel practically all over the ship; will disrupt ammunition hoists, dislodge and jam turrets, dish upper decks, kill all personnel on upper decks, anti-aircraft gun crews, fire-control parties in the tops, or any one standing on deck; will cause fire to break out, exploding all the anti-aircraft ammunition on upper decks, and sink or disable the battleship. If the bomb is exploded in the water alongside, the battleship will either sink or be permanently disabled (see pages 341 and 347).

an extent that, after the second year of the war, no movement was tried on the Western Front without a most thorough aërial preparation, and from that time until the end of the war the offensive air service, or that which gets out and fights the opposing air service and then his ground troops, constantly increased.

Since the war the lessons gained have been carefully studied, and their application to future requirements has been accurately estimated.

The branch of aviation which has been developed for bringing the enemy's air force to combat and forcing it to fight is called pursuit aviation. It is equipped with the fastest, most maneuverable, and most heavily armed airplanes that it is possible to obtain.*

Pursuit airplanes in the possession of the principal powers at present are of a speed of from one hundred and sixty to one hundred and seventy miles an hour, can climb to a height of 20,000 feet in twenty minutes, and are equipped with from two to four machine-guns.

With an air force, team-work is more essential than is the case in any other military organization, because the space in the air is so vast and separation from one's companions is so easy that the utmost care has to be exercised to prevent distribution and thereby allow an enemy the advantage of concentration against an isolated detachment.

The degree of success of these operations depends on the training of the pilots and their commanders and is a matter of years and not of months. There is no movement, combination, or method of flying which must not be known in its every phase by the navigating personnel of pursuit aviation.

This is the branch that has to be depended upon to win the air battles, and at the conclusion of the World War it constituted more than 60 per cent of all the offensive aviation.

AN AIR FORCE IS THE ONLY DEFENSE AGAINST SIMILAR FORCE

The only defense against an air force is another air force. Anti-aircraft guns or any defenses against aircraft from the ground have comparatively little effect. Only about one-tenth of 1 per cent of the airplanes going over the line in the American air service during the war were shot down by anti-aircraft weapons. While they are necessary, they are really auxiliaries of an air force and can do nothing decisive by themselves.

Although the war probably advanced aviation more than would fifty years of peace, still a great deal has been done since the war in the development of appliances really thought out during the war.

This has been particularly true of the second great branch of aviation, which is known as bombardment. This branch carries heavy missiles and drops them, or projects them, at the targets that they are designed to attack.

THE AIR BOMB AS AN ENGINE OF DESTRUCTION

Loaded with the high explosives of today, the modern air bomb will cave in the whole fronts of buildings, shatter armor, and demolish all sorts of military objects, including the destruction of life by concussion alone. For instance, the whole water-front at Halifax was destroyed by an explosion in the harbor.

Heretofore projectiles from large cannon have been designed to pierce the armor of battleships, and then cause their effect by driving the fragments through the bulkheads and into the various parts of the ship. Twenty-five such shots went clean through the German flagship *Derfflinger* in the Battle of Jutland, but, aside from killing about 200 of the personnel, never destroyed the speed of this ship. These twenty-five shots altogether had no more than about 1,000 pounds of explosive in them.

But one of our present air bombs, which weighs one ton and contains from 1,000 to 1,400 pounds of explosive, dropped on her from an airplane, would have wrecked this ship to such an extent as to put her completely out of action and end her usefulness as a war vessel (p. 347).

Our cities in this country are particularly subject to the destructive effects of bombardment on account of the inflammable character of the constructions and in many cases the difficulty encountered

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* See the NATIONAL GEOGRAPHIC'S "Aviation" number, January, 1918.

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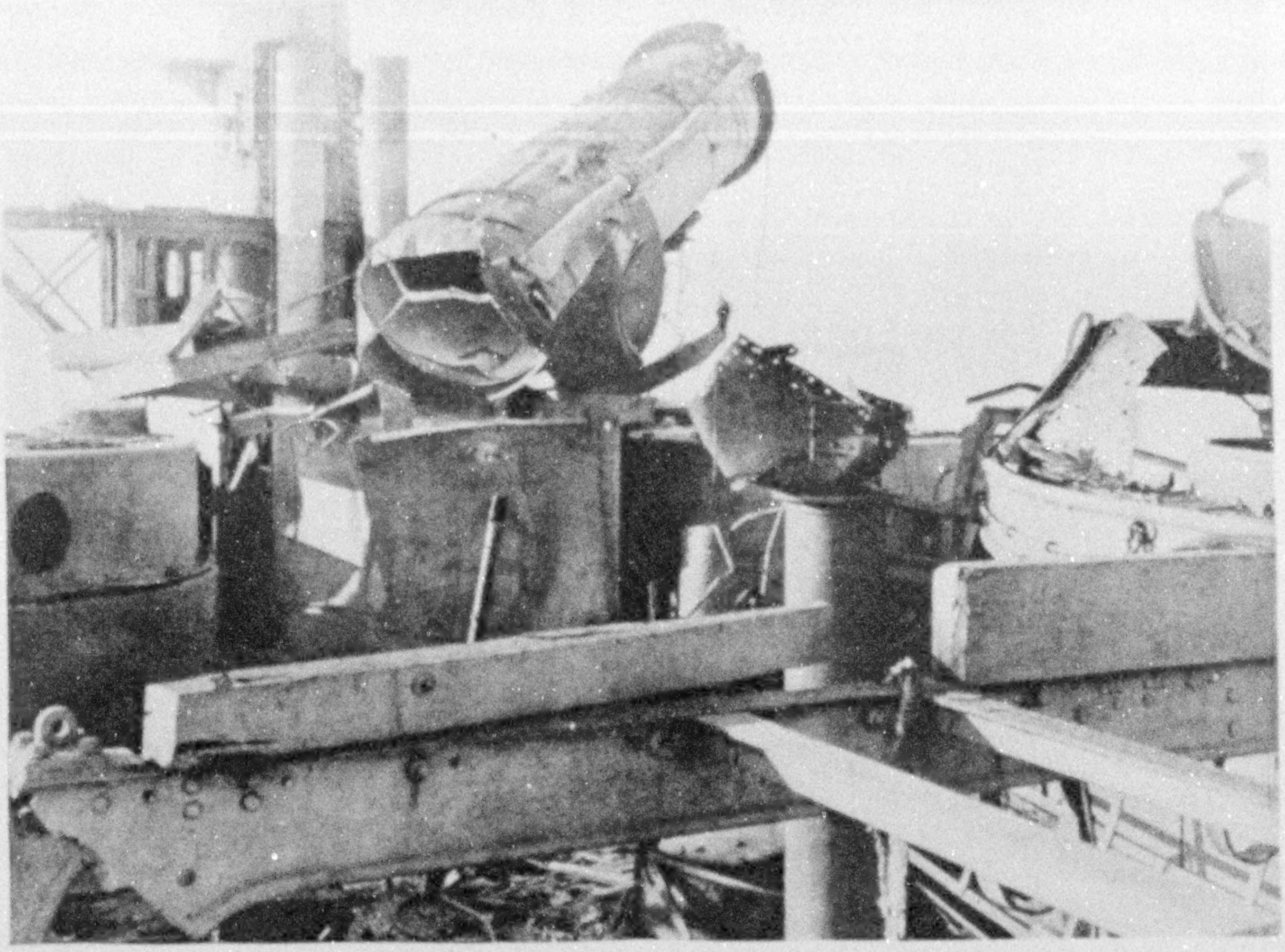
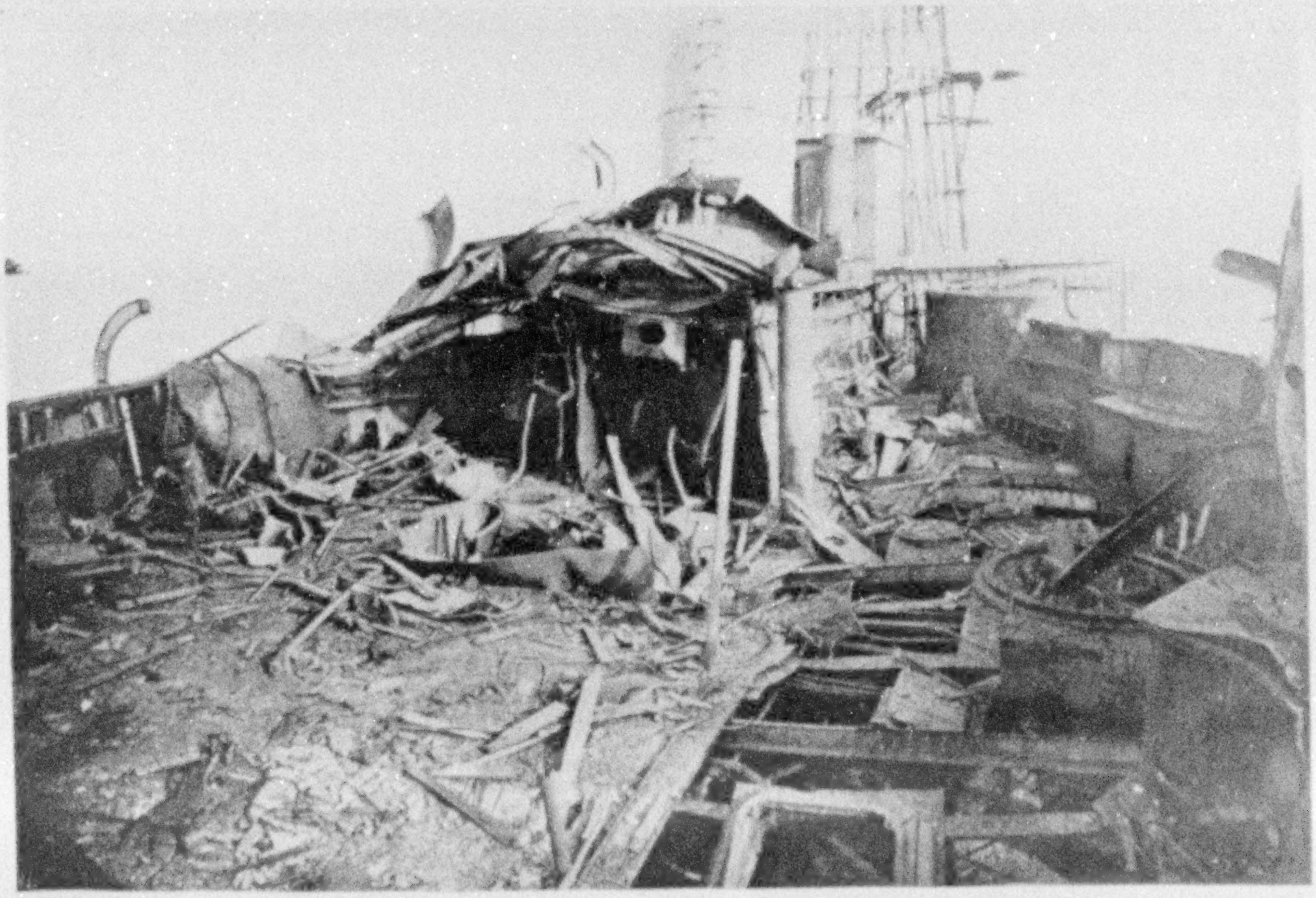


THE WHOLE CENTER PART OF THE "INDIANA" WAS SMASHED TO PIECES BY ONE AERIAL BOMB WHICH WAS PLACED ON DECK AND DETONATED



ANOTHER VIEW SHOWING DEMOLITION CAUSED BY THE SAME BOMB (SEE PAGES 340, 343, 347)

Photograph by U. S. Army Air Service

THE DETONATION OF A 600-POUND DEMOLITION BOMB

in getting people out of them in the event of such an attack.

NEW YORK CITY AS A TARGET

New York is a notable example. It is situated on a narrow peninsula, and so marked out by two rivers on each side of it that it cannot be mistaken from aircraft, either by day or by night. Communications off of this peninsula for people trying to get away from a bombardment attack are very bad, so that the population could not get away, and the conflagration which would be incident to it would be more serious than anything that has ever occurred in any city.

Bombardment from airplanes is not confined to a coast-line, because there is no coast-line in the air. The airplanes can fly inland to the limit of their gas, if unopposed, and deliver their loads of bombs. Airplanes can carry now from one to three tons of bombs, and a group of 100 airplanes is able to carry 100 tons, as distinguished from the groups that we had during the war, when one group of four American squadrons could carry only 3½ tons to the trip.

The initiation of gas attacks by the Germans has centered attention on the effect that gas would have if dropped from aircraft. It was not used in Europe from aircraft, because neither side desired to start it, as it would have led to a great deal of useless loss of life on both sides, and not much would have been accomplished, on account of the equality of aviation with both belligerents. If, however, one side had a decided air supremacy and had destroyed the air force of its enemy, and it desired to adopt these barbarous methods of warfare, it might believe that its ends would be furthered by the use of this matériel.

ALL NEW YORK WOULD HAVE TO WEAR GAS MASKS

In an area the size of New York, if two tons of crying gas were dropped every eight days, the whole population

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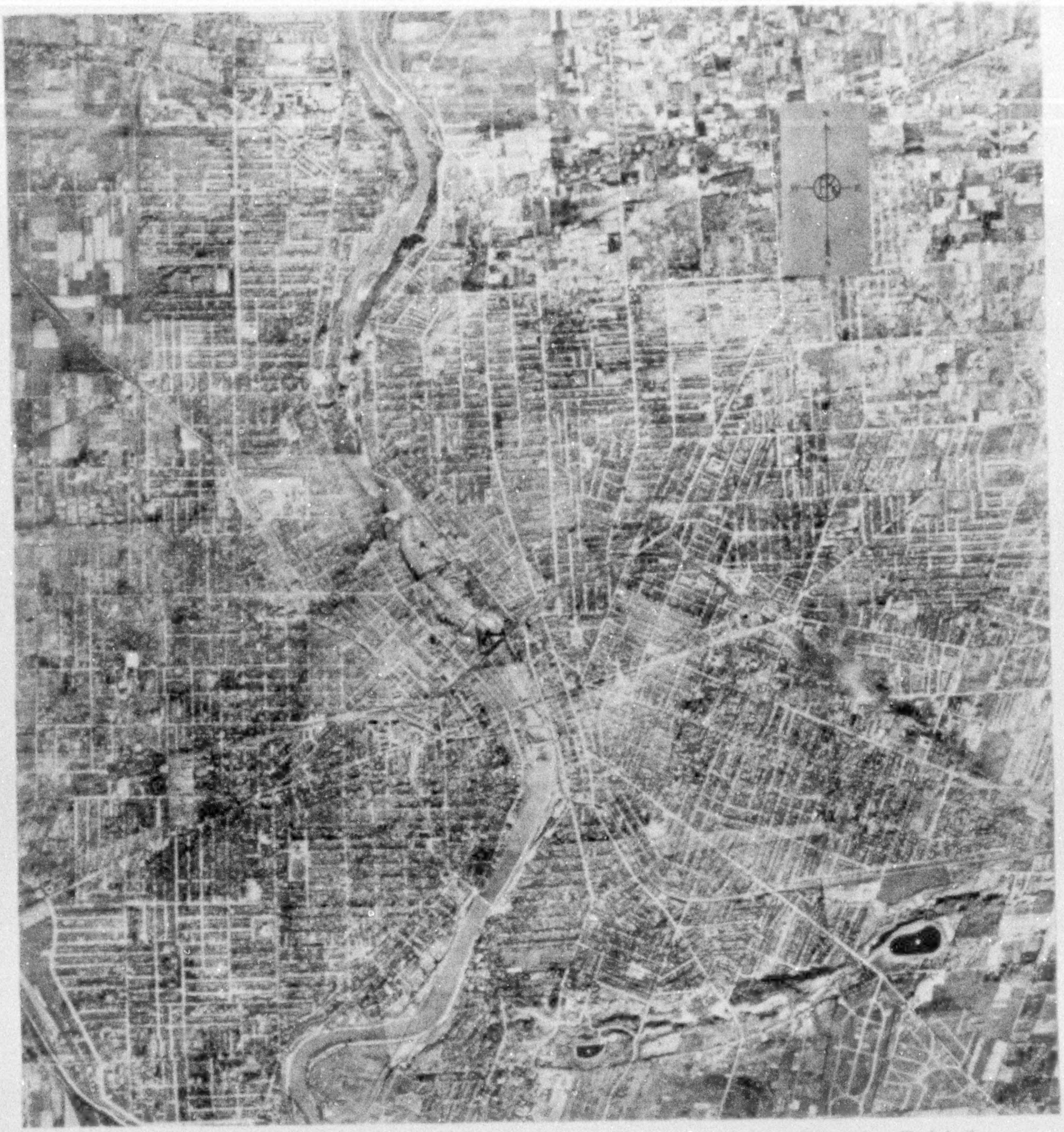

© Eastman Kodak Company

A MOSAIC MAP OF ROCHESTER, N. Y., A CITY OF 300,000 INHABITANTS, MADE FROM AN ELEVATION OF 10,000 FEET IN A SINGLE FLIGHT

The map is made from prints of eighty separate negatives, in the form of a single strip of film ten inches wide and seventy-five feet long, all taken in the course of a single flight of one hour and twenty minutes. Such an accomplishment suggests the great value of this form of aërial photography in map-making over otherwise inaccessible territory.

would have to wear gas masks and goggles in order to protect itself. Two hostile airplanes could accomplish this effect. If it were desired to use mustard gas, 70 tons of this very poisonous element would be necessary.

The greatest precautions would have to be taken against such an attack. As a matter of fact, it would cause the evacuation of the whole city, paralyze its means of transportation, and result in its virtual extinction as a port. If phosgene gas were used, 200 tons would be required to be dropped every eight days. This is a very deadly gas and will have almost immediate effect, and will kill every man, woman, and child not carefully protected against it.

Gases even more deadly than this are being experimented with and considered by all the nations. While we all hope that they will never be used, still precautions must be taken against their use; and the best precaution against any such danger is an adequate force of aviation to shoot the enemy out of the air.

In the defense of an area such as New York, all elements for its protection, such as search-lights for use at night, anti-aircraft artillery, machine-guns, and barrage balloons, must be used as auxiliaries under the command of the air force. Barrage balloons act as aërial barbed-wire fences, and at present can be raised to a height of about 20,000 feet. They are attached to the ground by thin cables, which will cut an airplane wing, break its propeller, and otherwise damage a ship.

The barrages, however, have to be protected by airplanes; otherwise the enemy will shoot them down. The anti-aircraft defenses of London were particularly efficient during the last war and were arranged as indicated above. Until their completion, London was subject to innumerable raids from both German airplanes and airships. Once the necessity for co-ordinated action in the air was realized, the effect was immediate.

The third great branch of offensive aviation, which was being developed just as the war ceased and which has received a great deal of development since that time, is what we call attack aviation—that is, the branch which utilizes machine-guns and cannon for shooting at objects on the earth or the water.

RADIO PROVIDES CONSTANT COMMUNICATION WITH THE AIR SQUADRON

The airplanes are armored over all of their vulnerable parts, so as to resist fire from rifles or machine-guns—in fact, they are really flying tanks—and one of their first objectives of attack will be actual tanks on the ground. These airplanes carry small cannon, which can fire at the rate of over 100 shots a minute, and from six to ten machine-guns, each of which can fire from 500 to a 1,000 rounds of ammunition per minute.

When one of these airplanes attacks its object, it looks almost as if the ground were being plowed up, from the intensity of the fire. They fly at very low altitudes and surprise the troops, motor trains, railroad trains, or whatever they desire to attack.

Nowadays air forces can be handled by radio telegraph and to some extent by radio telephone; so that a means of communication exists between airplanes while in the air, which gives very much added power of combination to all aërial operations.

PHOTOGRAPHS MADE FROM 28,000-FEET ALTITUDES

In addition to the three principal branches of aviation that I have mentioned above, which are just as different in their methods, armament, and the training required for their personnel as are the infantry, cavalry, and field artillery, there is a fourth branch of aviation, called "observation," which is necessary for reconnoitering and scouting and photographing the country.

The photograph forms the most accurate representation of anything that is possible, and with the equipment that we now have, photographs can be taken from altitudes as high as 28,000 feet.

Military maps of whole areas are made by aërial photography, far into the enemy's country. His railroad lines, his roads, his depots for ammunition and stores of all sorts, and all of his cantonments or concentration points for troops can be photographed and an estimate made of the size of the body of troops which is occupying it.

Observation aviation also adjusts or regulates the fire of artillery. In fact, the artillery is virtually handled from the air. The target is reported by the airplane and the direction and range given to the gunners.

In the World War the observation airplanes had to keep in touch with the troops themselves when all other means of communication failed. Although the telephone could be kept with the troops almost always, yet in the heat of a great battle the wires were severed and the troops lost complete touch with those behind them, even by runners and by all the devices known; so the airplane had to fly right through the barrages of artillery fire, and even infantry and machine-gun fire, to get to their troops and find out where they were; also to see

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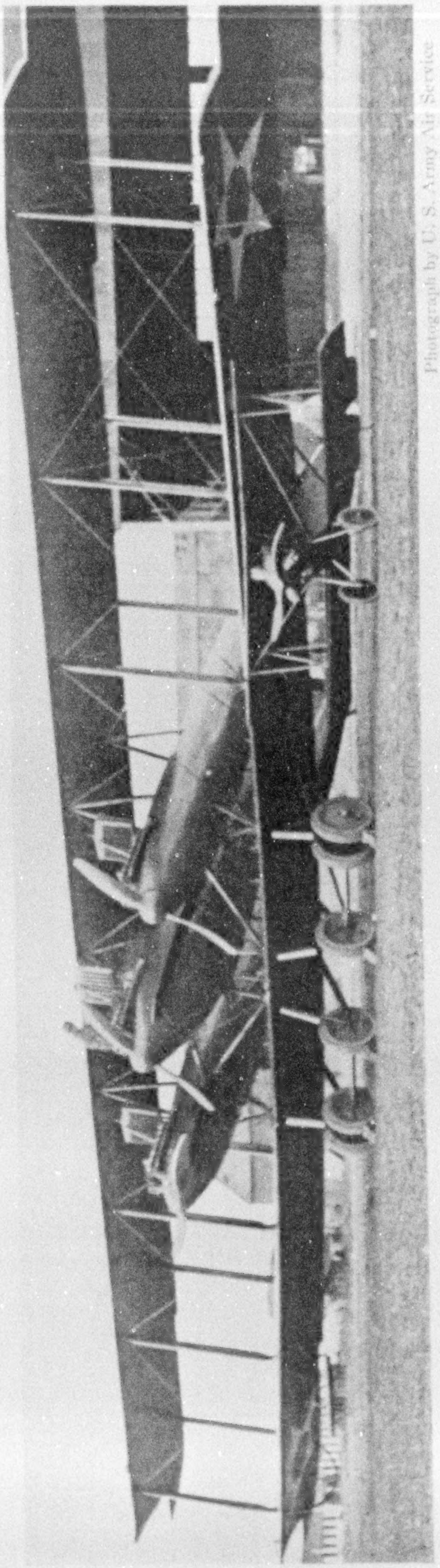


Photograph by U. S. Army Air Service

THE THREE-MOTORED "OWL," WITH A SPAN OF 105 FEET, AS COMPARED WITH THE TINY MESSENGER PLANE SHOWN UNDER IT, AT THE RIGHT

that more ammunition was brought up to them, or even drop ammunition and food to them in some cases.

DIFFICULTIES IN SIGNALING FROM THE AIR

The airplanes, when they reached the point where they thought the troops were, would fire a certain kind of a rocket, and the troops would answer by putting out a panel, or a piece of cloth of a certain dimension and color, on the ground, indicative of the unit to which they belonged.

It took a long time to get this branch of the Observation Air Service and the troops working together, because the troops all thought that when the airplane shot the rocket it indicated its position to the enemy and called their attention to that locality; and then when they showed their panel, that the enemy knew exactly where they were.

Observation aviation is the branch above all others where coördination with the ground troops is essential, and on account of the many and diversified appliances, such as radio, photography, and signal devices of all kinds, it is very difficult to maintain in an entirely efficient condition.

THE AIRPLANE'S SPEED ADVANTAGE OVER THE BATTLESHIP

During the war almost all aviation was used over the land, because that was where it would have the maximum effect.

After the Armistice, however, and particularly after the British airship R-34 had flown across the Atlantic from England to New York and back again, and the transatlantic flight had been made by airplanes, attention was drawn to the possibility of using aircraft for protecting the sea communications of a nation in very much the same way that navies are today; so that the first problem presented is what effect aircraft would have against heavily armored ships—warships.

There never was any question that, even with small aërial bombs, unarmored vessels can be sunk and disposed of at will—that is, within the radius of operation of the airplane. Airplanes have from five to eight times the speed of battleships, and therefore can always catch up to them when and where they wish, and consequently have the power of initiative.

As we lost so few airplanes from anti-aircraft fire during the war, it is entirely safe to say that we will lose very few as the result of any action from the ships themselves.

The defense of the vessels with anti-aircraft artillery and machine-guns will not be as efficient as the same defense on land would be, because these guns are placed on a movable platform when on the ship.

The effect of a bomb on an armored battleship is terrific. Not only does it cause great material damage, but it shatters all the navigating appliances, kills a great many of the personnel, knocks out all lighting systems, and stands a good chance of blowing the structure completely to pieces (see pp. 340 and 342).

The probability of hitting the battleship is very much greater than is the case with gunfire at a range of over 20,000 yards. In fact, it is estimated that at 40,000 yards the great guns will only make 1 per cent of hits against a battleship, and, as the life of the largest guns is only about 200 rounds, they will only make about two hits during the whole time they are in existence. Even to do this, an organization of airplanes has to be furnished to observe the fire and tell the gun crew where their shots are falling.

These airplanes, if of a bombardment type, would make many more hits than do the cannon. In fact, good bombardment airplanes will make from 30 to 40 per cent of hits, at least, which will affect in varying degrees the ability of a battleship to exist.

BATTLESHIPS MAY BECOME LIKE ARMORED KNIGHTS OF OLD

Before the coming of an air force the development of war vessels on the water had been in increasing armor, increasing gun-power, and increasing speed. The increase in armor, of course, increased the weight and diminished the speed of these leviathans.

Compared to an airplane, these great vessels are very much like the knights in the middle ages, encased in their heavy armor, in which they could scarcely move, as compared to the light-armored foot soldier, equipped with a musket. If the weapons which the air force now has for attacking battleships are so efficient, and these weapons consist only of bombs that were developed for use on land, one can expect remarkable results when this problem is studied and armament devised especially for the attack of shipping.

As the airplanes undoubtedly will be able in future wars to control the surface of the water, an air force will be the key to the command of the sea.

Submarines undoubtedly will have a great value; but, on account of their slow speed and expense, they will gradually give way to an air force, as the latter develops in its radius of action and power.

The present battleship, with its accessories, costs about $45,000,000, and for this amount of money about 1,000 bombardment airplanes can be constructed, each one of which can carry a bomb sufficient to sink a battleship. The airplanes require a personnel of only two or three men, whereas the battleships require 800 or over.

These are only some of the comparisons that interest the nations today, in culling the lessons from the last war.

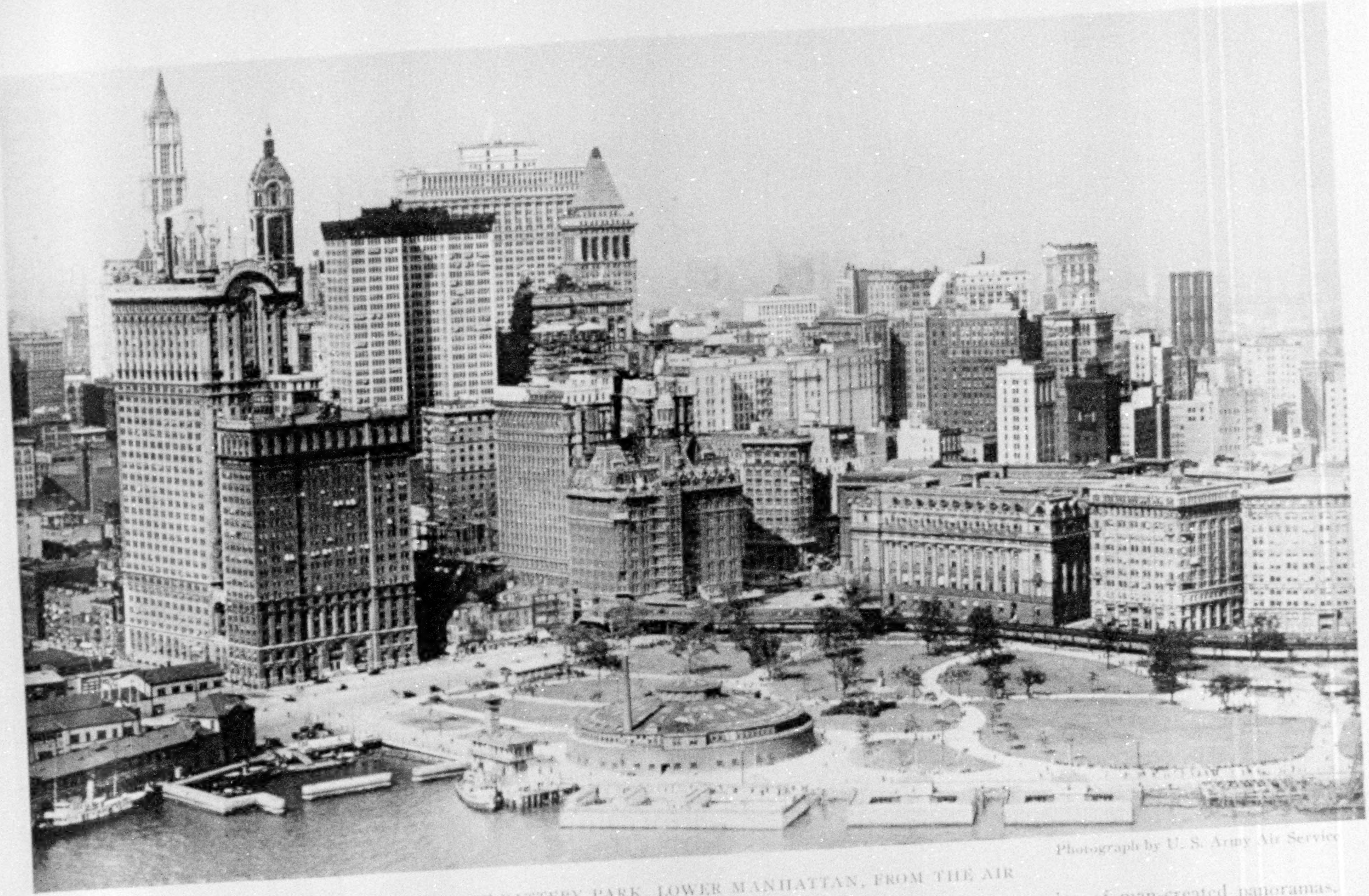
As the airplane engines increase in reliability, the forced landings will become less and less, so that airplanes can act over water with almost as much security as they can act over land.

Furthermore, vessels of very high speed can be equipped to form movable airdromes, or airplane carriers, as they are called; and as these are not weighted down with armor or heavy guns, and as everything can be stream-lined on them in a way that has never been done with battleships, a corresponding increase of speed is possible.

The same airplanes that are used over the land can be used over the water, both as a means of coast defense from land bases and from airplane carriers.

A NON-STOP FLIGHT OF 4,000 MILES

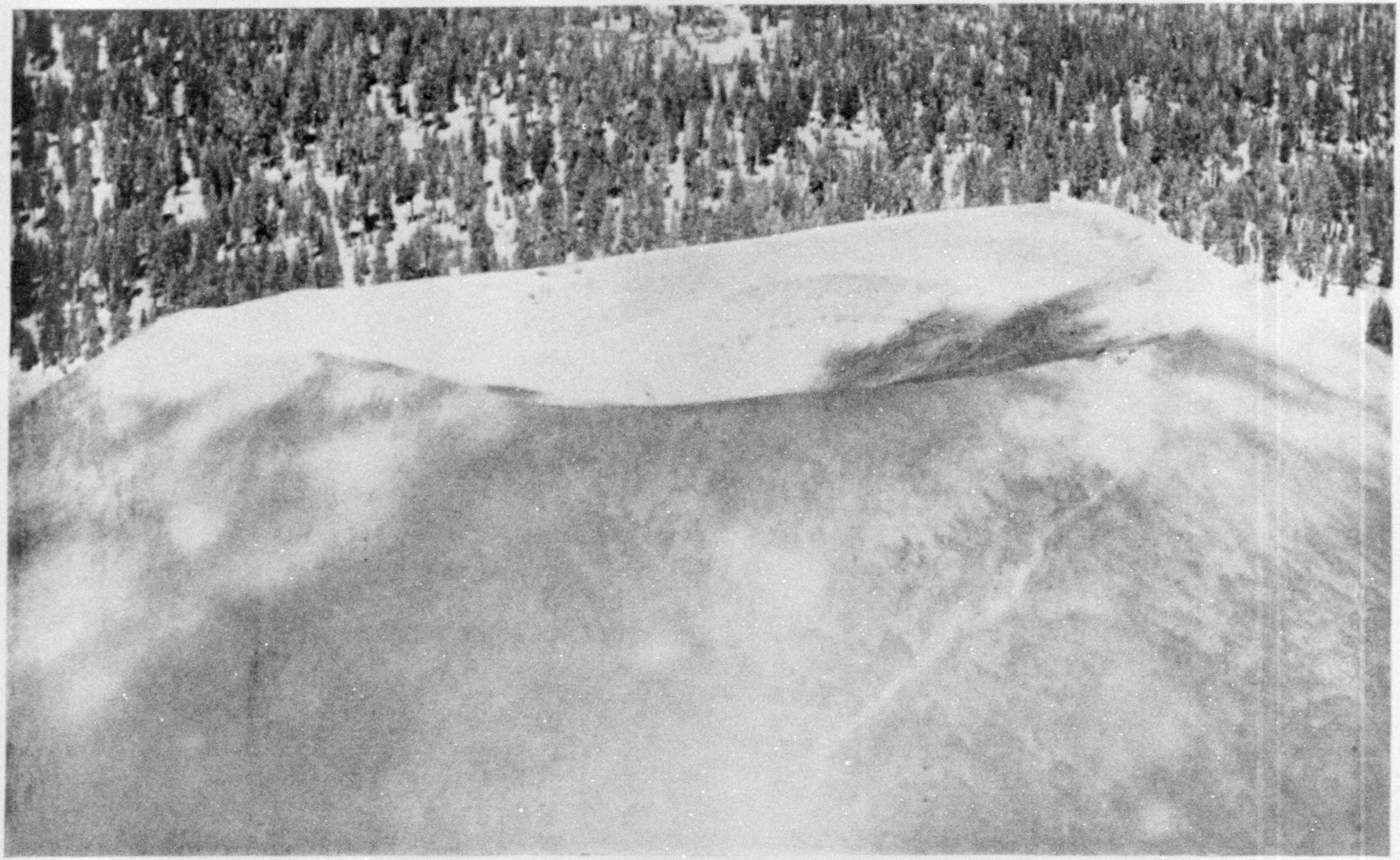
So far, only airplanes, or heavier-than-air craft, have been discussed. Lighter-than-air craft, or airships, as we call them today, have taken on an increased interest because of their economical application to commerce. The rigid airship as con-



Photograph by U. S. Army Air Service

A VIEW OF BATTERY PARK, LOWER MANHATTAN, FROM THE AIR

With its incomparable towers and giant office buildings, the skyline of New York presents the most impressive of man-created panoramas.



Photograph by U. S. Army Air Service

THE CRATER OF A CINDER CONE, NEAR MOUNT LASSAN, TAKEN FROM THE AIR BY THE U. S. ARMY AIR SERVICE FOREST FIRE PATROL

Each day sees a new application of aircraft to the arts of peace, and, while the World War advanced the science of aviation more rapidly than the most optimistic prophet could have foreseen, commerce and industry are now reaping the rewards. The airplane is proving a potent factor in checking the ravages of forest fires in the West.

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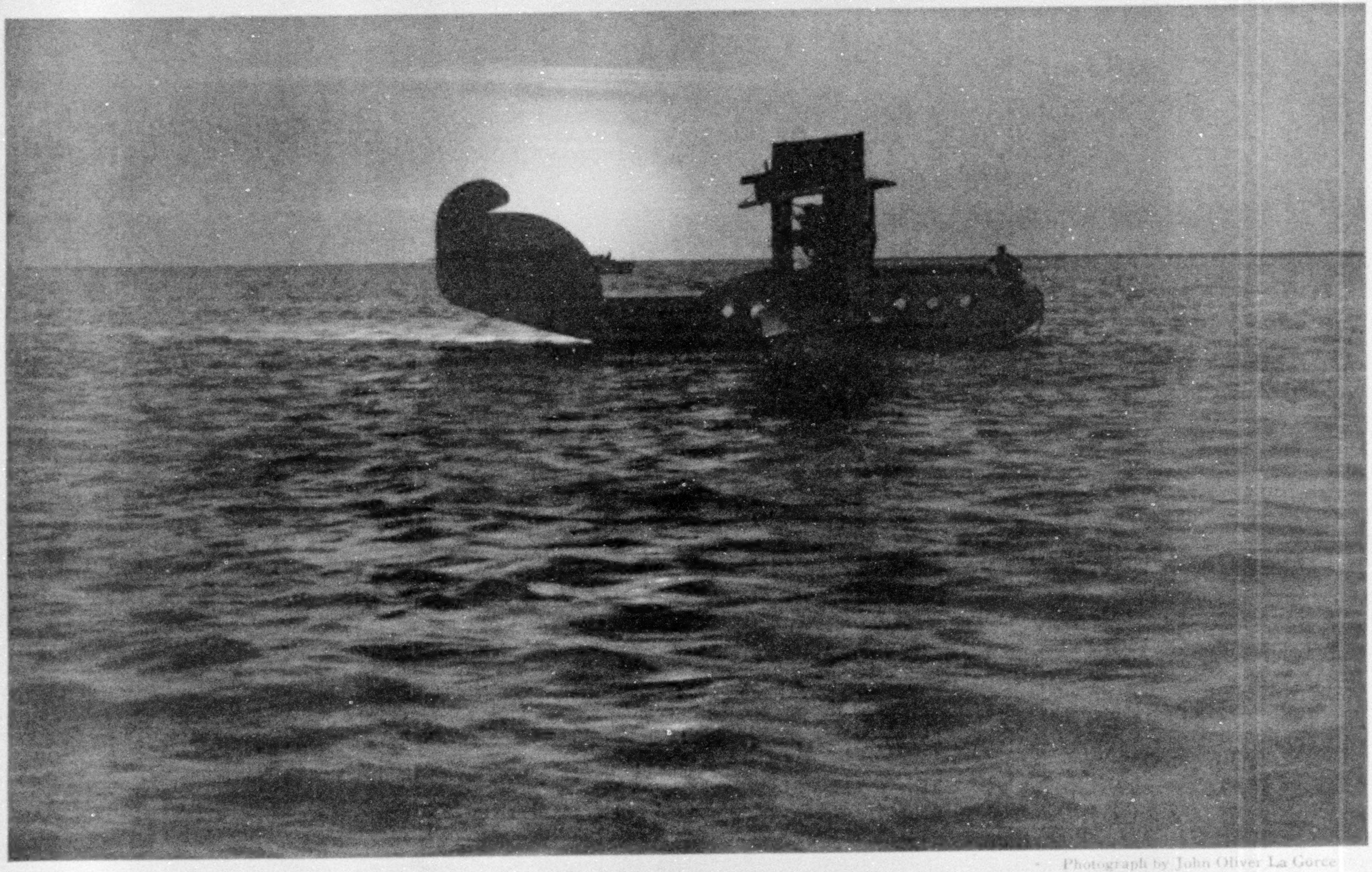

Photograph by John Oliver La Gorce

A SEAPLANE AT SOUTHPORT, NORTH CAROLINA, EN ROUTE FROM NEW YORK TO KEY WEST

In order to escape a heavy storm, this passenger plane made harbor at the tiny village of Southport, known for its shrimp fisheries. The photograph was taken at dawn. Recently a squadron of twelve U. S. Navy seaplanes flew from San Diego, Calif., to Panama, and despite a heavy squall in the Gulf of Tehuantepec, only one forced landing is reported. Never before had so large a squadron of any navy made a flight of nearly 500 miles without a stop.

structed in Germany has proved its great usefulness, both in war and peace.

Originally devised for reconnaissance and observation over the North Sea, these great airships were used for bombardment even against England and France, and did a great deal of work over Russia during the war. In fact, one made a non-stop flight of over 4,000 miles, to German East Africa and back again to Europe. On account of their ability to remain at very high altitudes, comparatively few were damaged or destroyed by airplanes.

At the end of the war the Germans had one airship, the L-72, that was designed to attack New York. This ship had a fuel capacity of about 17,000 miles, and was designed to be able to maintain itself at a height of 30,000 feet, with crews provided with oxygen apparatus and the engines arranged to be kept warm at this great height, which it was then impossible for airplanes to reach.

Had she appeared over New York and bombarded that city, there would have been absolutely no defense against her whatever, and this airship could have come down to any height desired.

The French now have this airship in a hangar in the southern part of France and are allowing their engineers to obtain all the technical data from her with a view to building new ones.

When a nation or organization has developed airships of this kind and worked for years on them, it is a very difficult matter for any other organizations to catch up with them and be able to construct as good ones for many years. This is on account of the engineering and structural difficulties encountered.

AN AIRSHIP CARRYING 20 TONS CAN TRAVEL 90 MILES AN HOUR

In a military way, a nation needs airships for reconnaissance at a great distance, over the land or over the water. They are needed for attacking hostile airships, for dropping explosives against targets on land or water. A large airship can carry 200 fully equipped infantrymen and drop them off in parachutes if necessary; also, it can act as a means of transport for army units or other air units.

As a large airship can transport 20 tons or more at a speed of 70 to 90 miles an hour, more points can be reached than would be possible in other ways. In fact, in most places in the United States today, with the roads that we have, it would be impossible to supply an army of any size over them; and as railroads exist only in certain places, airships will be the natural means of supply and should be developed accordingly.

For commercial purposes the airship offers very interesting possibilities. There is no dust or smoke or unpleasant experience in traveling by them. The degree of safety, with a proper ground organization of airship stations, is very great. In fact, the Germans have carried over 200,000 passengers without a fatality.

For communication across the Pacific, or particularly to South America, airships will be a very efficient means of travel.

When we turn to airplanes and commercial possibilities we are immediately concerned with the high cost of the necessary ground organization. Due to their limited gas capacity and the fact that their engines must be running at all times to stay in the air, being heavier-than-air, every provision has to be made for guiding them properly across the country and having airdromes, or landing places, at convenient intervals. An organization of this kind we call airways, and without it no real commercial development of aviation is possible.

These airways should be established by the government; should join the principal centers of population by well-marked routes through the country, and provide airdromes at 200-mile intervals, where facilities for repair, fuel, and proper attendants on the airplanes can be obtained. Between these places emergency landing places should be distinctly marked, so that a landing could be safely made if trouble occurred.

Of course, this seems impracticable from the standpoint of cost; but when one considers that automobiles have to have roads everywhere they go and gas stations from which they can get oil and gasoline, one concludes that the establishment of airways through the country would be not nearly as expensive and

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would tremendously facilitate rapid communication from one part of the country to another.

IT COSTS $60 AN HOUR TO OPERATE AN AIRPLANE TODAY

The cost of operation of airplanes is very great, the average at this time being about $60 an hour, and is about 20 to 50 per cent more for seaplanes. In fact, seaplanes, or flying-boats, are the most expensive aircraft to operate.

Of course, seaplanes have the advantage of being able to land in many places not provided with airdromes. This is particularly so in Canada, where a very great percentage of the surface of the country is covered with water and lakes. In fact, seaplanes can fly all over Canada and almost always have a landing place within gliding distance. On the other hand, seaplanes are worthless in the winter time, when the lakes and rivers are frozen or have floating ice on them.

It is estimated that carrying passengers costs almost 70 cents per mile.

The great advantage about airplanes is their speed; and it has been found that the higher one is able to get, the greater the speed that can be obtained, on account of the lessened resistance of the air. At 30,000 feet, speeds of over 200 miles an hour have been obtained, with ordinary equipment, merely adapted for that purpose and not constructed specifically for it.

The way that these high altitudes are obtained is by the use of a turbo-booster in connection with the gasoline engine. The turbo-booster is a turbine which is actuated by the exhaust from the engine, this in turn works an air compressor, or air pump, that delivers compressed air to the carbureter of the engine, thereby keeping up a proper mixture, which otherwise would be lost on account of the rarefaction of the air at high altitudes.

By the use of this device greater altitudes will be obtained and the power of an engine kept up in a remarkable manner. For instance, by using the turbo-booster with a 400 horse-power engine, this engine will deliver as great horse-power at 30,000 feet as a 1,000 horse-power engine would without the turbo-booster.

SPEEDS OF 300 TO 400 MILES PER HOUR ARE POSSIBLE

We believe that, with the development of equipment of this kind and the construction of special airplanes to be used at very high altitudes, speeds of 300 miles an hour and over can be obtained.

At these altitudes, also, there are regular winds blowing, similar, in a way, to the trade winds, some of which have a speed of over 100 miles an hour; so that, by combining the speed of our airplanes with the speed of the wind, we will get velocities of from 300 to 400 miles an hour in many cases. This will enable very rapid communication between America and Europe, San Francisco and New York, or other places of corresponding distances. This class of transportation we believe is not very far away.

The United States has the best climate, all the natural resources for the construction of airplanes, the manufacturing ability, the engineering ability, and its men make the best pilots in the world.

From the standpoint of national defense, we can get greater security, dollar for dollar, from an air force than we can from any other military element.

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The sugary cake and pie
It gives a zest to all the rest
And makes you strong and spry."

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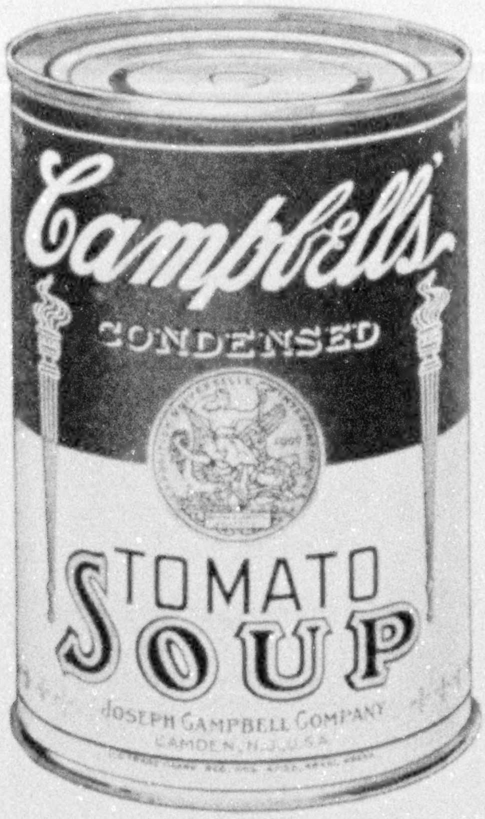
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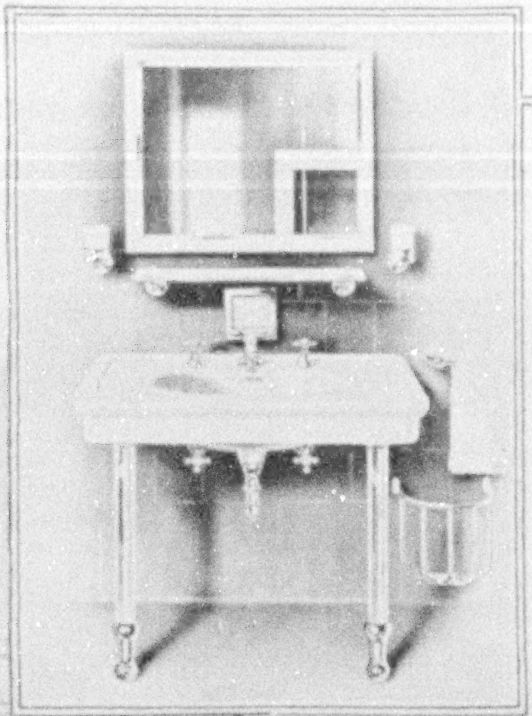

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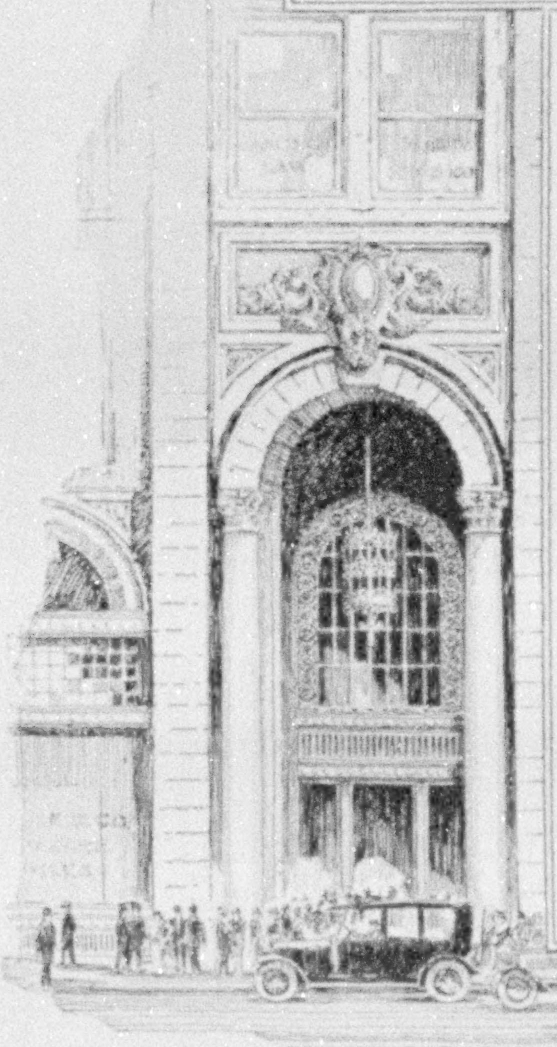

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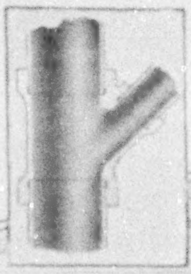

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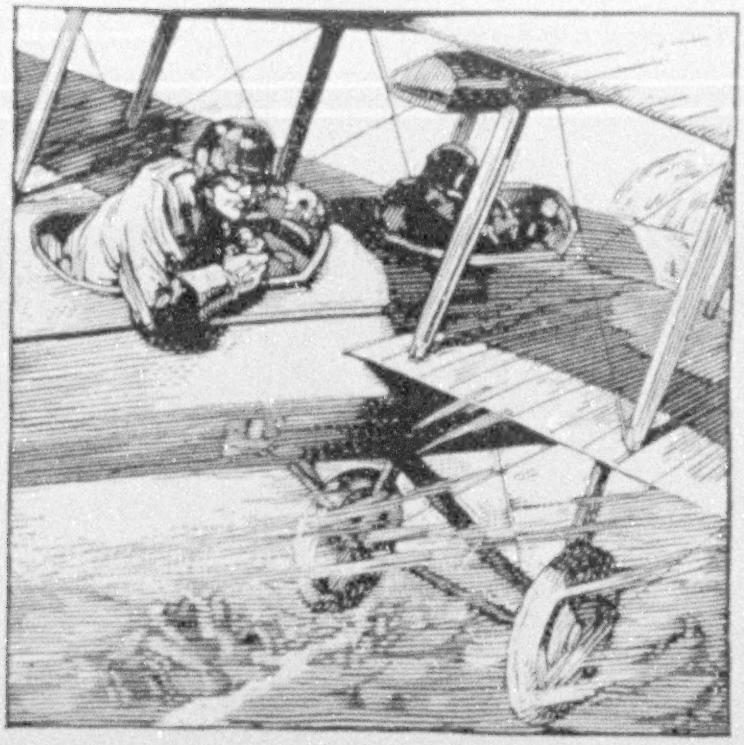

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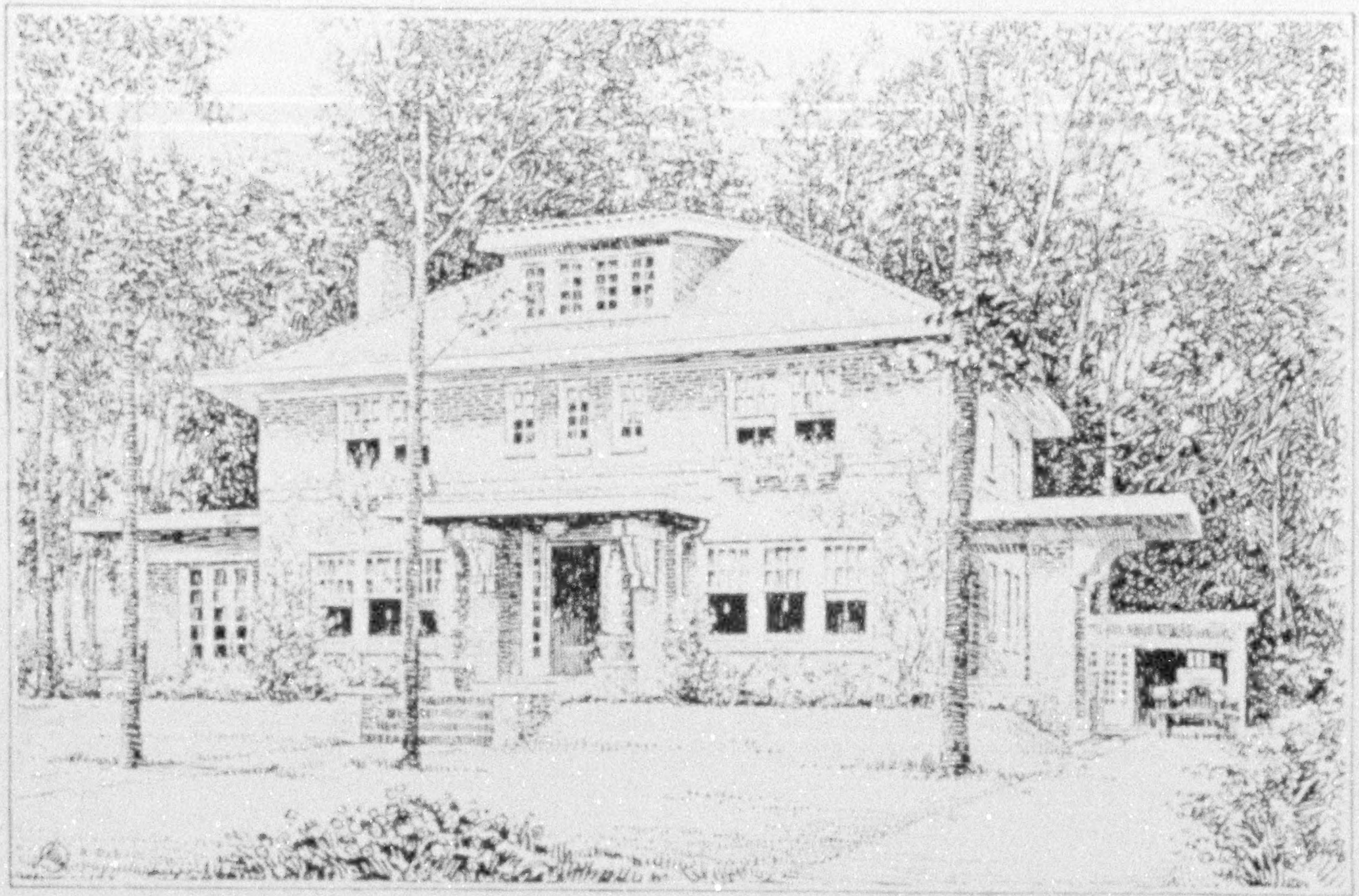

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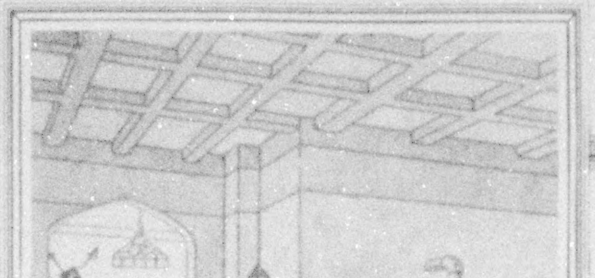

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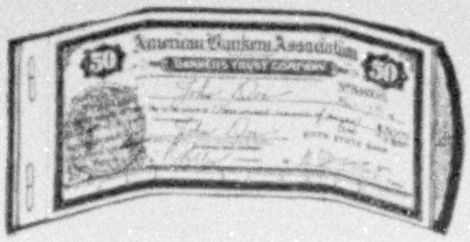

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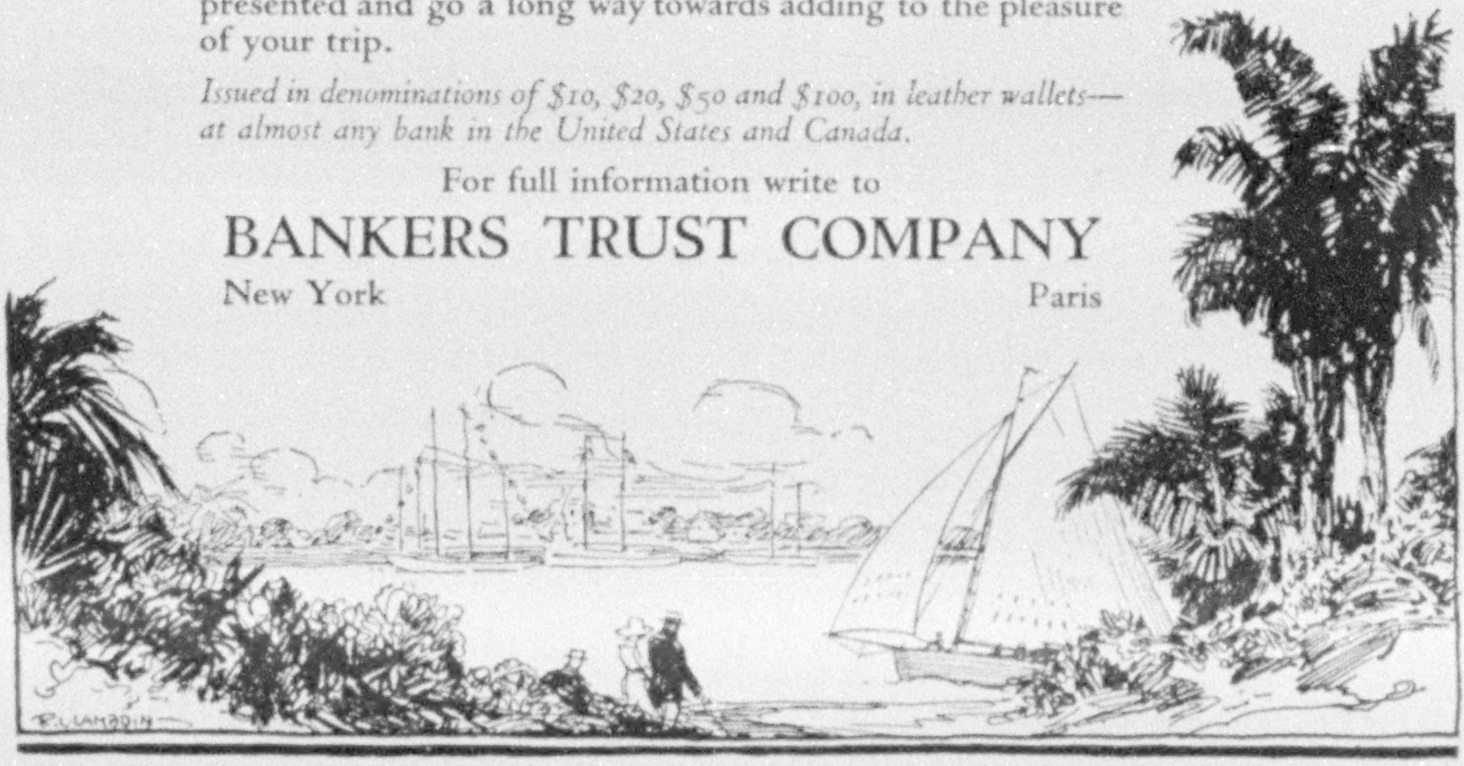

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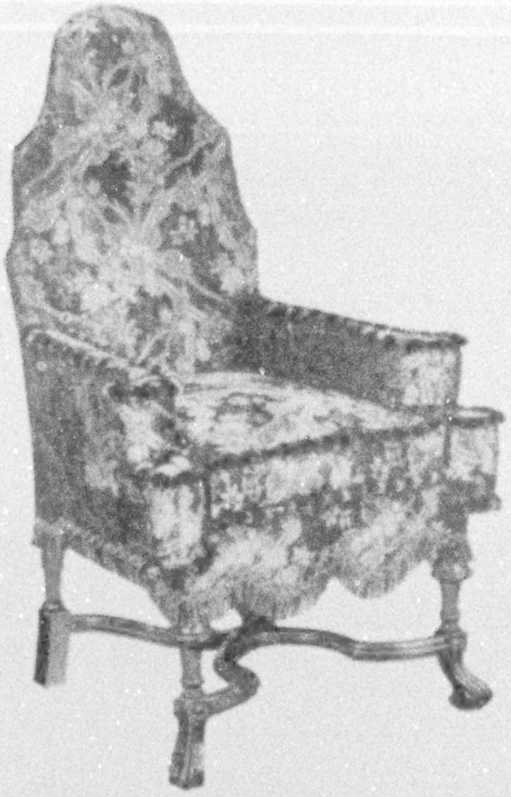

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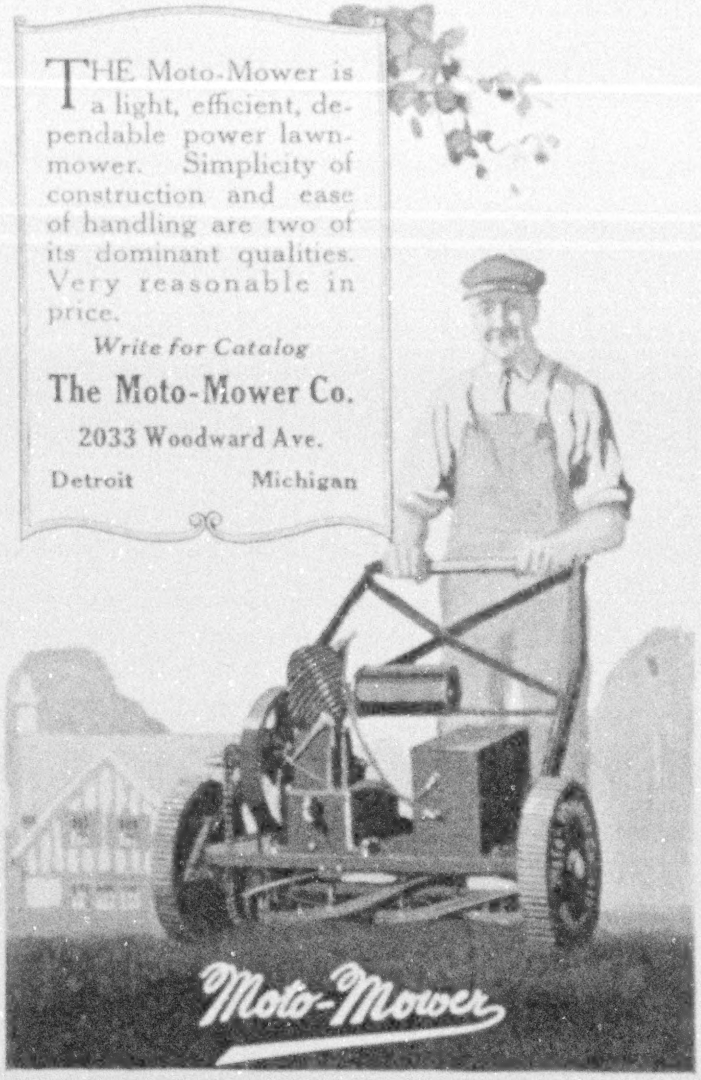

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DOWN TO 1921

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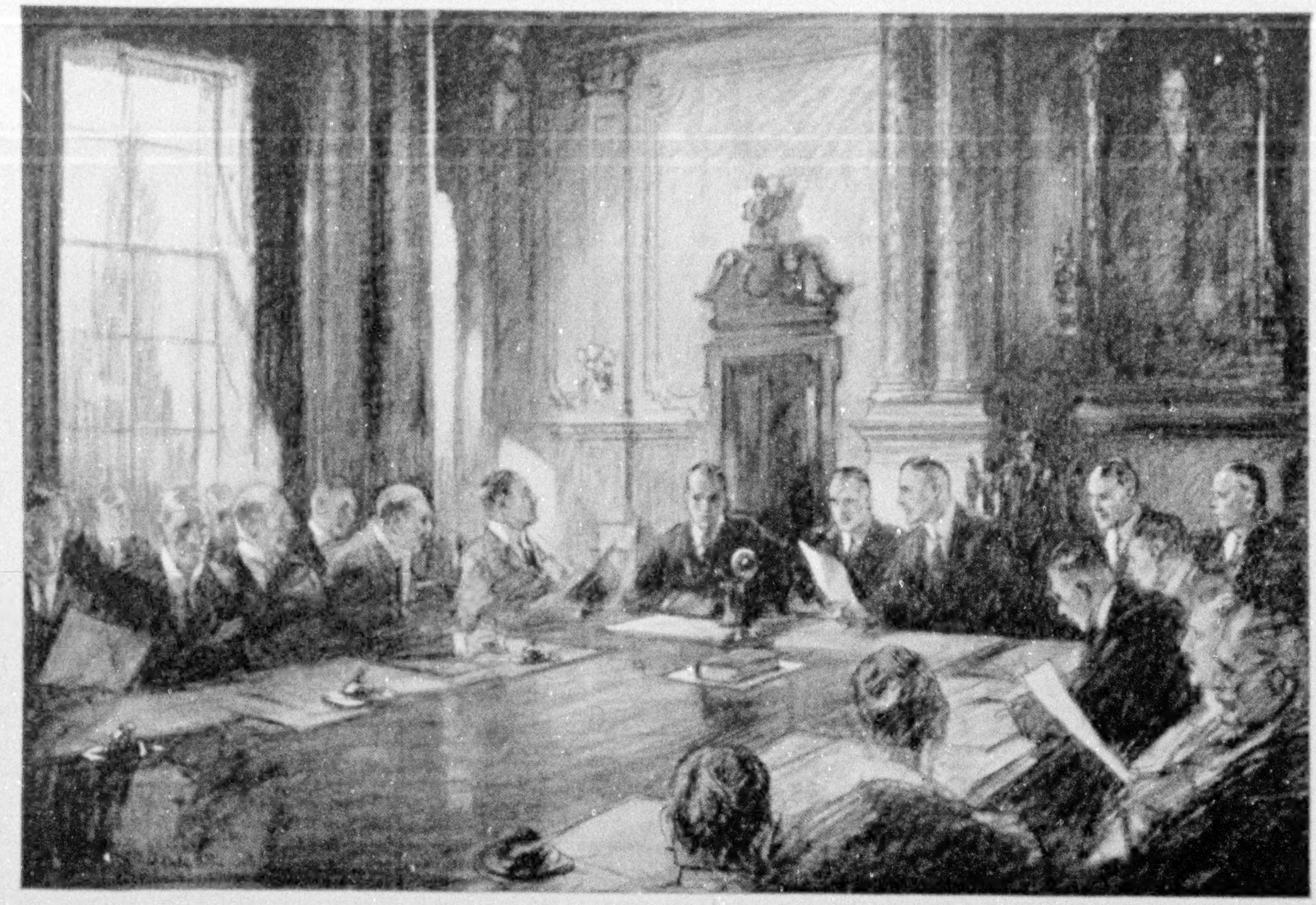

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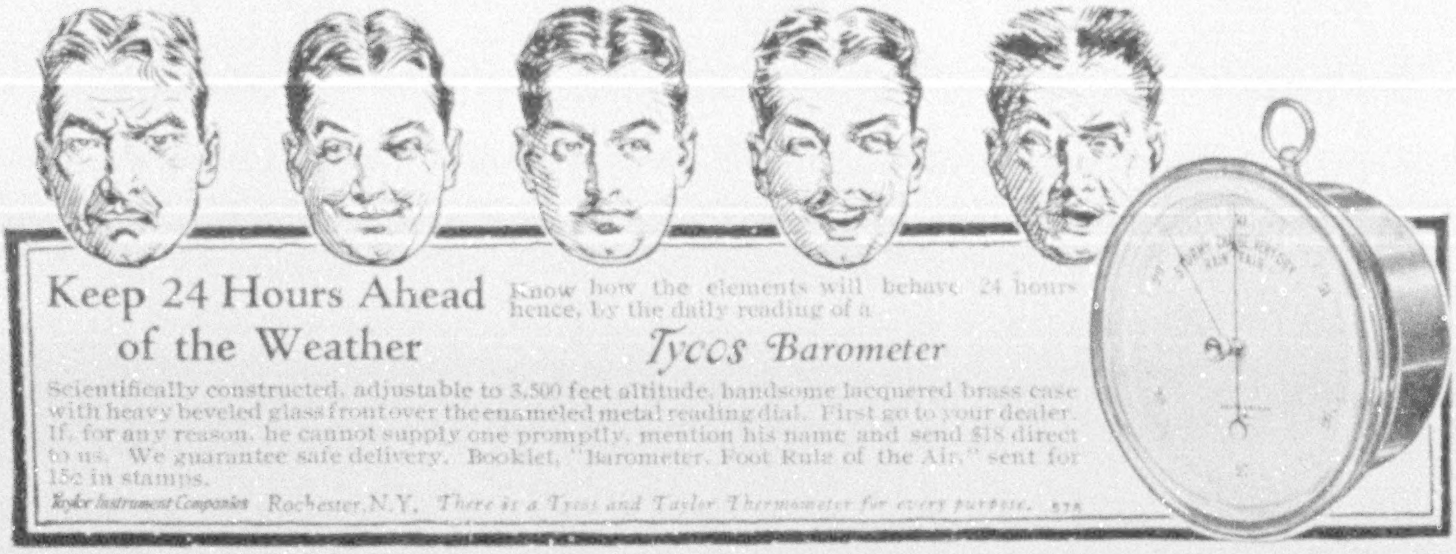

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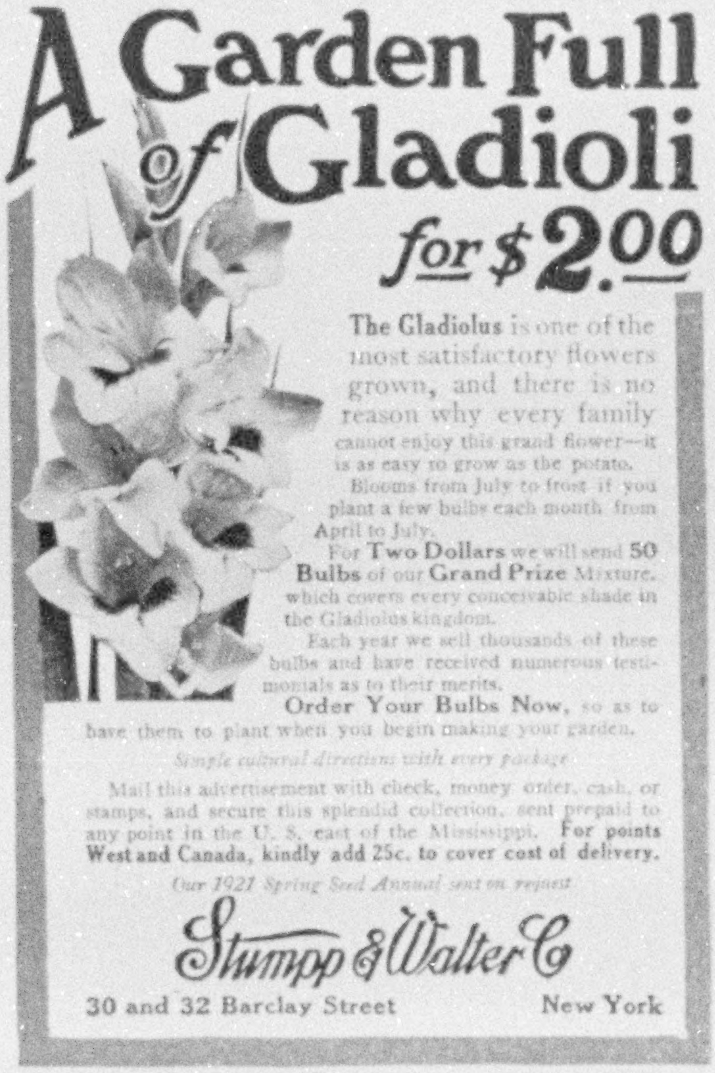

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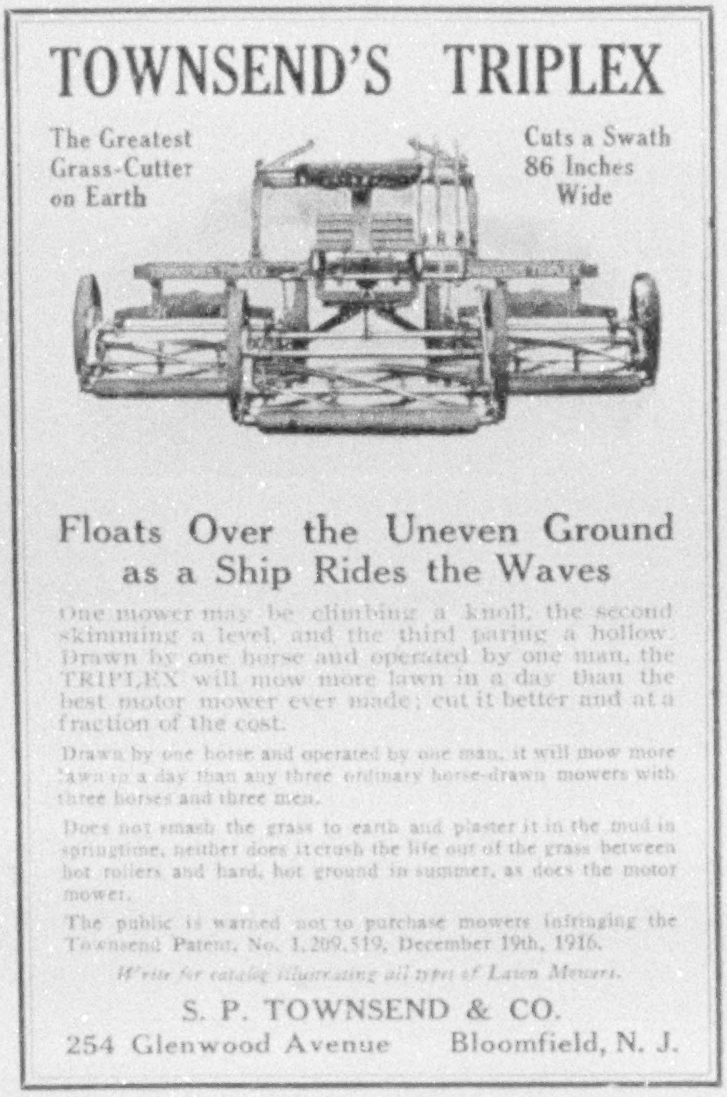

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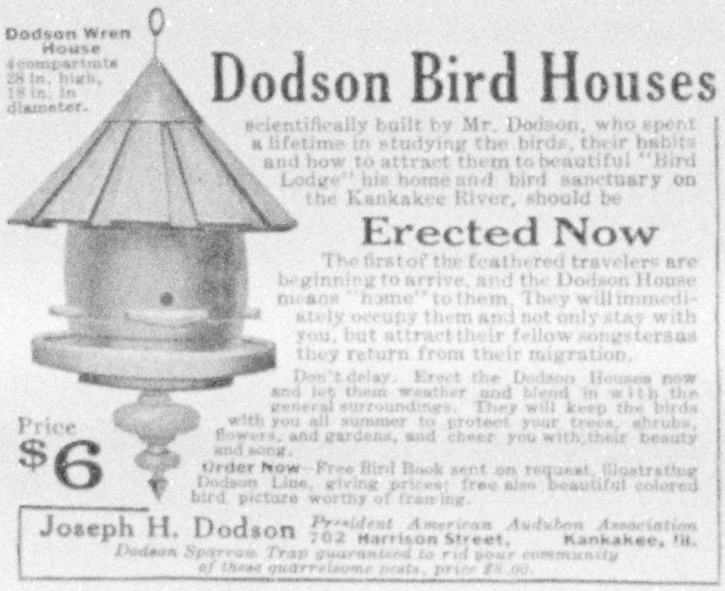

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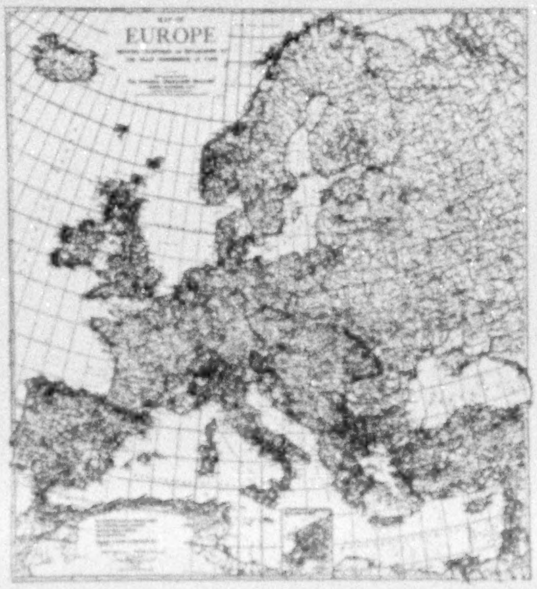

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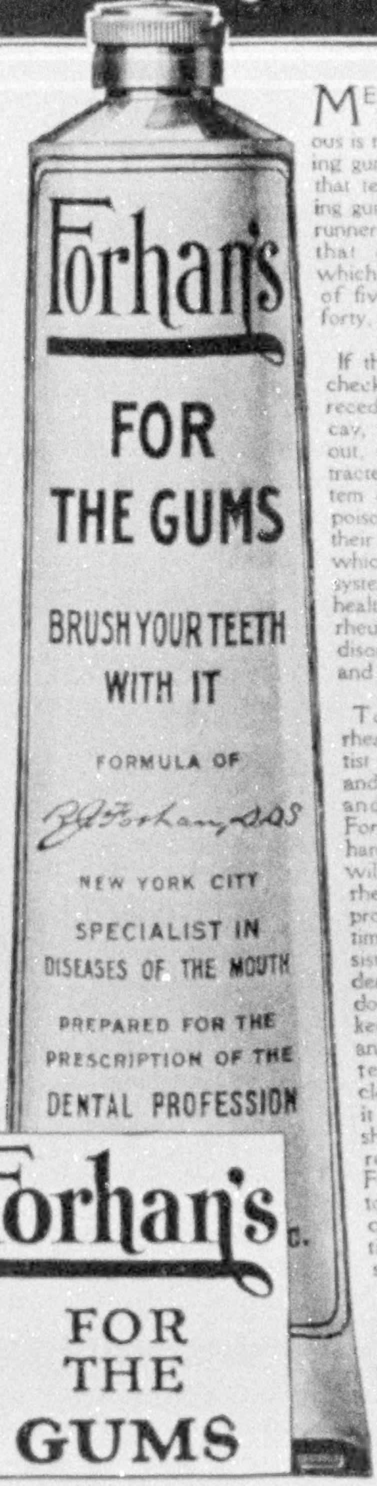

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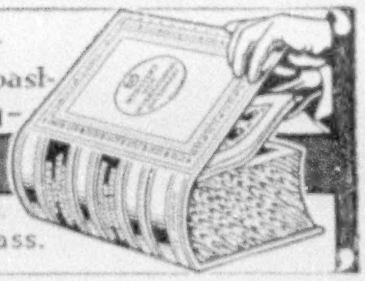

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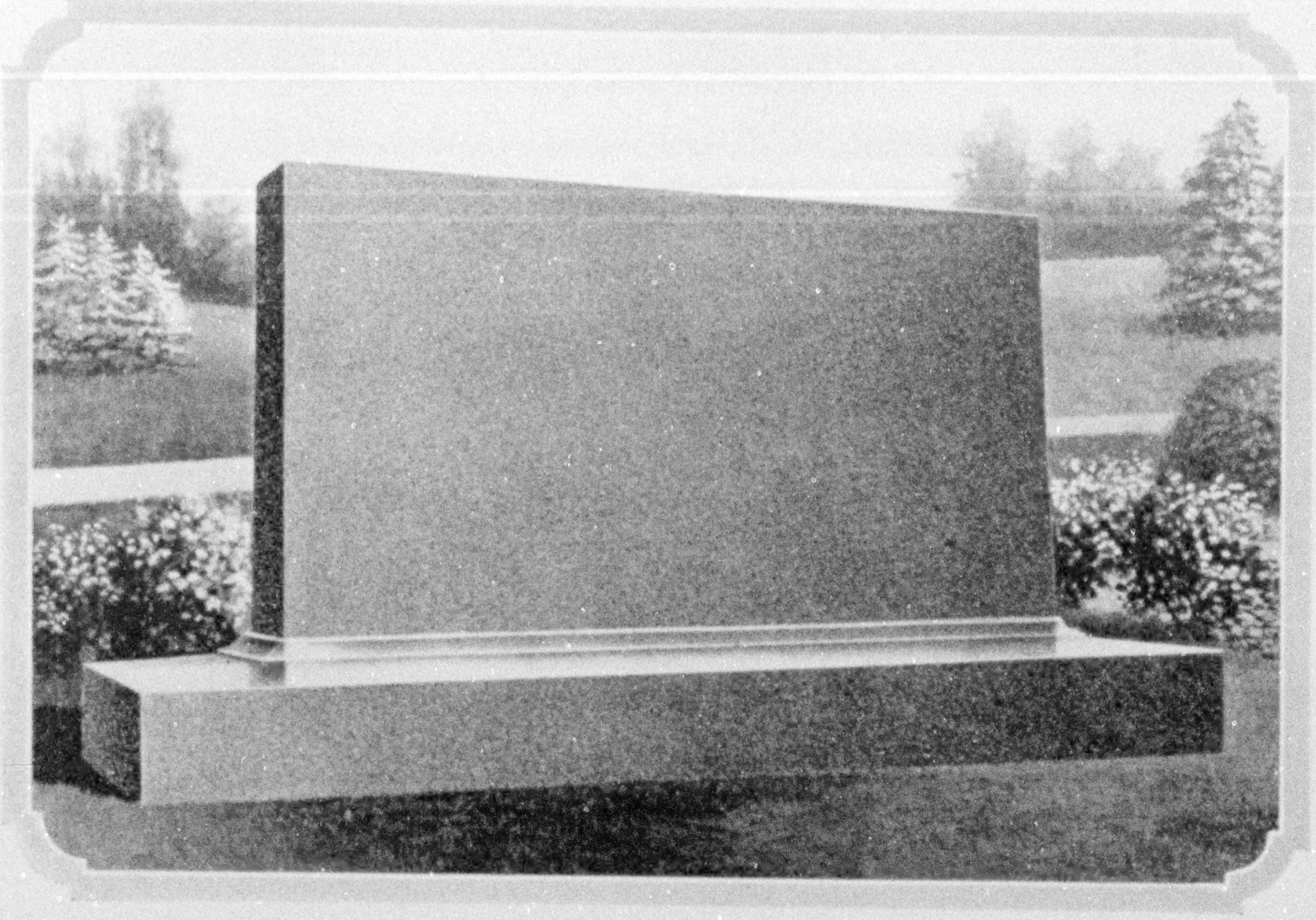

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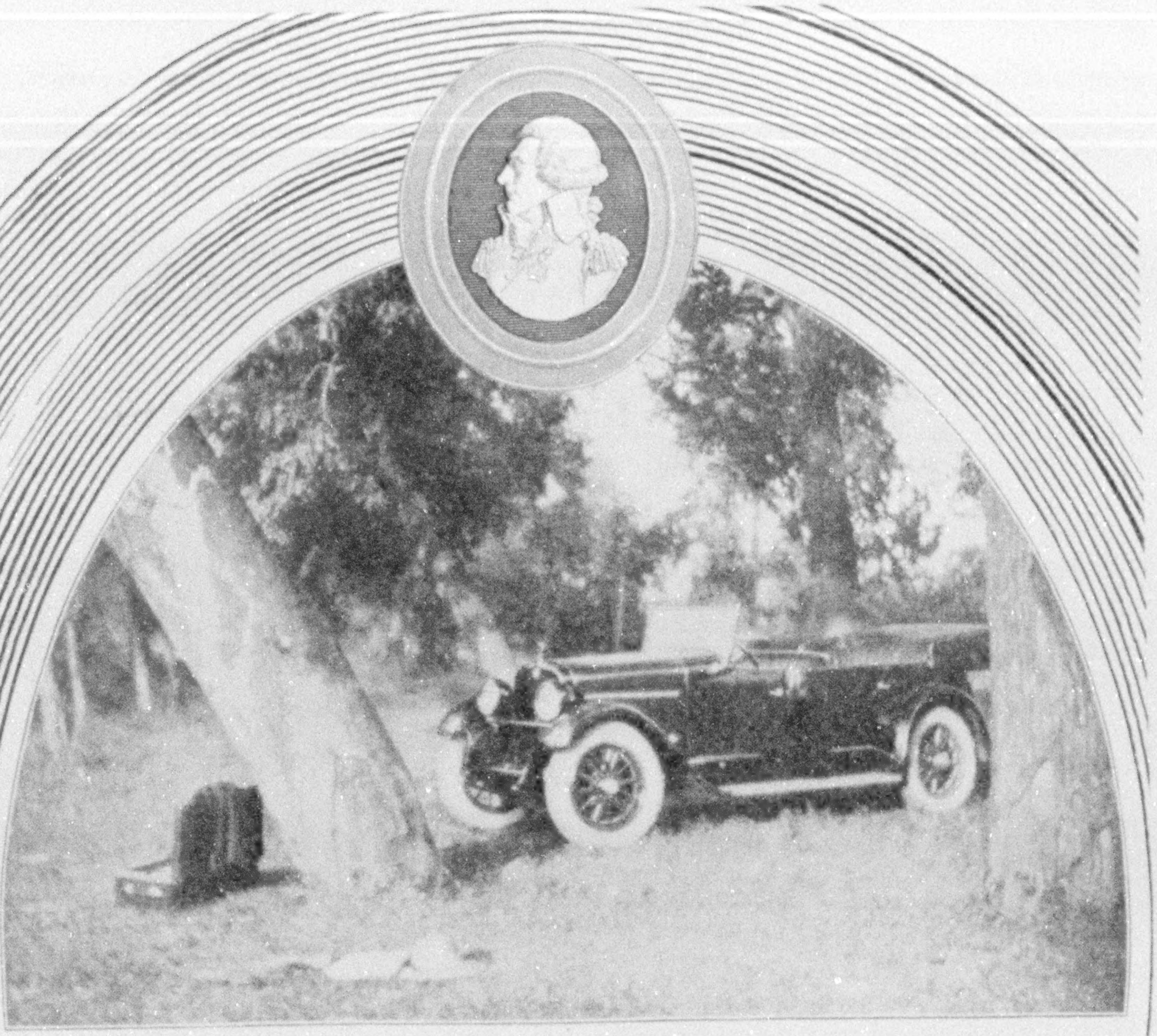

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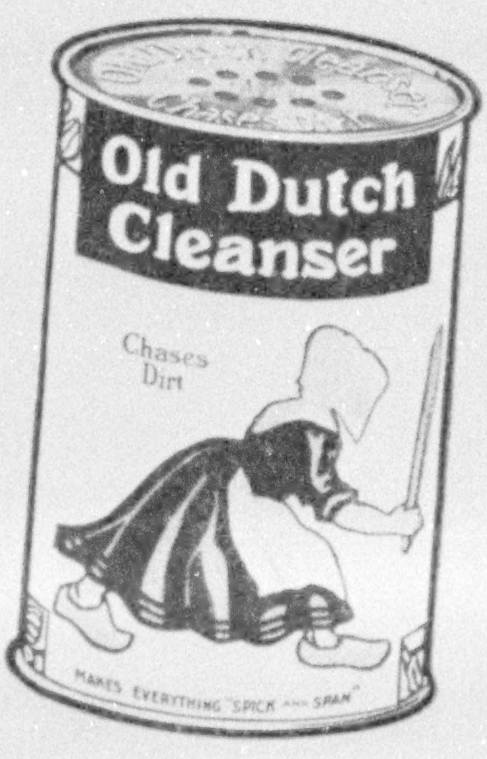
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Use Old Dutch for the daily clean-up in the bathroom, it makes porcelain, marble, tile and metal fixtures look like new. Contains no caustics or acids; does not injure the finest surfaces; cannot roughen or redden the hands.